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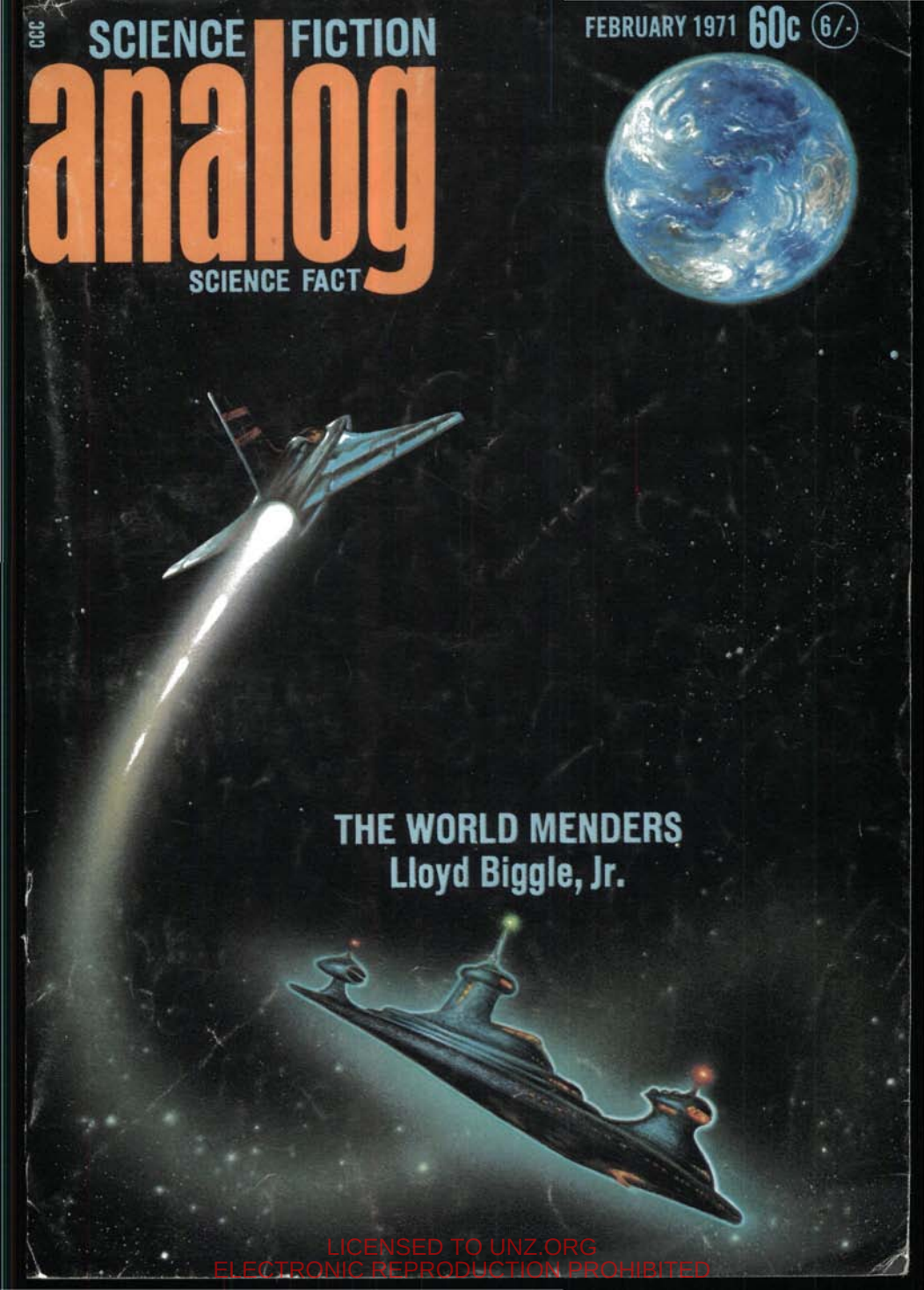

THE WORLD MENDERS
Lloyd Biggle, Jr.

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an editorial by
John W. Campbell

TRADITIONAL VALUES

Any fundamentally sound idea can be carried too far and become a fanaticism—and the essence of any fanaticism is, simply, that there is Only One Right Way and We've Got It.

Even the objective physical scientist can get suckered on that one—because while his field of study may be objective and physical, he remains a human being whose mental nature is inherently subjective. As a scientist who bases his thinking on careful laboratory experiments—a sound method that has yielded immense and reliable benefits—he displays his human tendency to fanaticism by holding that *only* laboratory evidence is sound data. That something which cannot be confirmed by repeatable experiments in a laboratory is not usable information.

That repeatable laboratory experiments are highly important is not really open to argument; it's an exceedingly fruitful, and, therefore, valid, method of learning and confirming derived ideas. But it is not the Only One Right Way—in fact, there are many areas where it cannot be applied as it is now thought of, and others where we certainly can't apply it with any tools available to us.

Example: As of 1800 many astronomers strongly suspected that the "fixed" stars weren't fixed; by that time they had some pretty good telescopes, could measure star positions with high accuracy, and had tried measuring star positions for changes. With several million stars visible to choose from, naturally they chose the wrong stars—there are darned few of them that move across the firmament fast enough for ordinary means of measurement. (It's different when you finally develop high-precision photography, "blink comparators" and microdensitometers.) The rate of

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motion of a star may be 200 miles per second, but because of interstellar distances, the angular rate of motion is usually so small it can't be detected in a human lifetime.

However, Halley, in 1817, showed that both Aldebaran and Arcturus moved across the firmament; he had studied star maps as much as two thousand years old, and the movement of those stars—relatively near Earth; fifty-five and thirty-three light-years, respectively—had accumulated enough in two millennia to be obvious. It could be detected readily by naked-eye observation by anyone patient enough to wait around for two thousand years while it happened.

Even the motions of more distant stars would be readily observable by ordinary naked-eye observation if you just used a little patience; after all, the Big Dipper wasn't a dipper when we men started doing those cave drawings one hundred thousand years ago.

We might properly say that the optimum tool for much astrophysical work is not a super-telescope mounted in space, not a hyper-spectroscope of unlimited resolution and total spectrum coverage from 1.0 Angstrom to 100.000,000—but a time machine. Want to study stellar evolution? The mechanism of supernovas? How galaxies form? A small telescope—maybe a 6″ reflector and a modest spectroscope—would help, of course, but remember that our spaceship will take us near almost every imaginable type and class of star, in almost every possible stage of evolution. Our spaceship called Earth that circumnavigates the entire galaxy about once every 200,000,000 years.

Curious about what ended the Age of Dinosaurs? What caused primeval Pangea to break up into drifting continents 200,000,000 years ago—and what Earth's surface was like before that, so you can solve the problem of planetary dynamics? A time machine would be far better than any Mohole Project.

Indications now seem to suggest that what ended the Age of Dinosaurs was a relatively nearby supernova explosion, when the Solar System was around on the other side of the galaxy, half a Great Year ago. When a giant star turns into an exploding nuclear bomb, the fallout and radiation blasts everything within half a dozen light-years with hard radiation. Not even ordinary interstellar distances are great enough to render the fallout of a 4,000,000-mile-diameter detonating A-bomb harmless.

The atmosphere is adequate protection against ordinary intensities of stray radiation in space—the atmosphere, reinforced by Earth's magnetic field, and Sol's greater, farther-reaching field. But, if a neighboring giant star detonates, the result is not "ordinary in-

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tensities" of radiation. Land life gets sprayed with high levels of hard radiation, both high-energy photons and particulate. The result is a tremendous wave of mutations; only the sea creatures, living under a deep blanket of dense, radiation-absorbing water would be protected.

The mutations are apt to bring *finis* to many species by direct action—and to others indirectly, as a few of the mutations turn out to be markedly favorable. The mammals, with their strange new characteristics, originated at just about the time the dinosaurs were vanishing.

Now obviously things like that aren't subject to laboratory test—at least not for some little while. We aren't about to trigger a supergiant star into supernova detonation just yet, and see what it does to neighboring planetary systems.

Then there are a lot of things on a smaller scale that call for a time machine more than any other tool; you don't need super-dooper hyper-precision devices to measure stellar movement if you can just use patience—a millennium or so of it.

Now the point of this is that while you and I and all living scientists simply *can not* use millennial patience—the human race can. The modern species of man is apparently about 150,000 years old; the stars have moved quite a bit in that time. The glaciers have come and gone and surged back and retreated. A number of animal species have evolved and others have failed and died out. (And I don't mean those that the rise of man's technical civilization killed off.)

Various types of social systems have evolved, been tried out, and been discarded over those one hundred and fifty millennia. No man can have such patience; the human race has.

The ancient builders of Stonehenge didn't have precision telescopes; they made up for the lack by using many lifetimes of naked-eye observation—their own form of time machine!—to determine the motions of the Earth, Sun and Moon with precision.

To determine factors accurately, you can approach the problem with exceedingly sophisticated ultra-precision instruments—or you can make fairly crude observations extended over a long period of time. Thus, although even the greatest telescopes can't see Pluto well enough to measure its diameter, and its mass is known only in the vaguest sort of way—with the result that it isn't known whether its density is 5.0 or 50.0—the length of its day is known with five-figure accuracy. Reason: the planet appears to have some kind of a blob on one side, and photoelectric observations of its brightness show periodic variations. Even though no one period can be measured to better than $\pm 10\%$, observations of several years, and hundreds of

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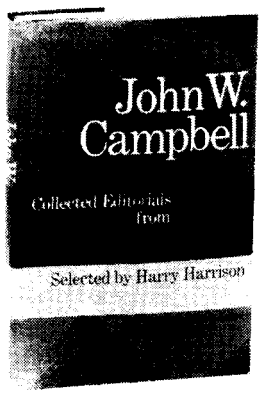

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cycles allows a determination with great accuracy.

As of now we do not *know* that the speed of light is in fact invariant; measurements made over the last half-century or so have appeared to show a progressive change at least on the order of the accuracy of measurements. Maybe the value of c changes with time? Have patience; we'll know for sure in just a millennium or so.

But the area wherein the long view is essential—and laboratory experiments under full control are simply impossible—is sociology.

One of the major stupidities of the professional sociologists—and psychologists, also—is the oft-repeated statement that "you can't experiment with human beings."

Look, friends—if you do not have full knowledge of the consequences of your actions, and you have to act—you're experimenting, whether you admit it or not.

No human being or group of human beings today has full knowledge of the complex interaction of human dynamics called "sociology."

Ergo, *all societies are always experimenting and always have been.*

In the absence of complete knowledge of the structure and dynamics of human minds—psyches—any action taken with another human being is an

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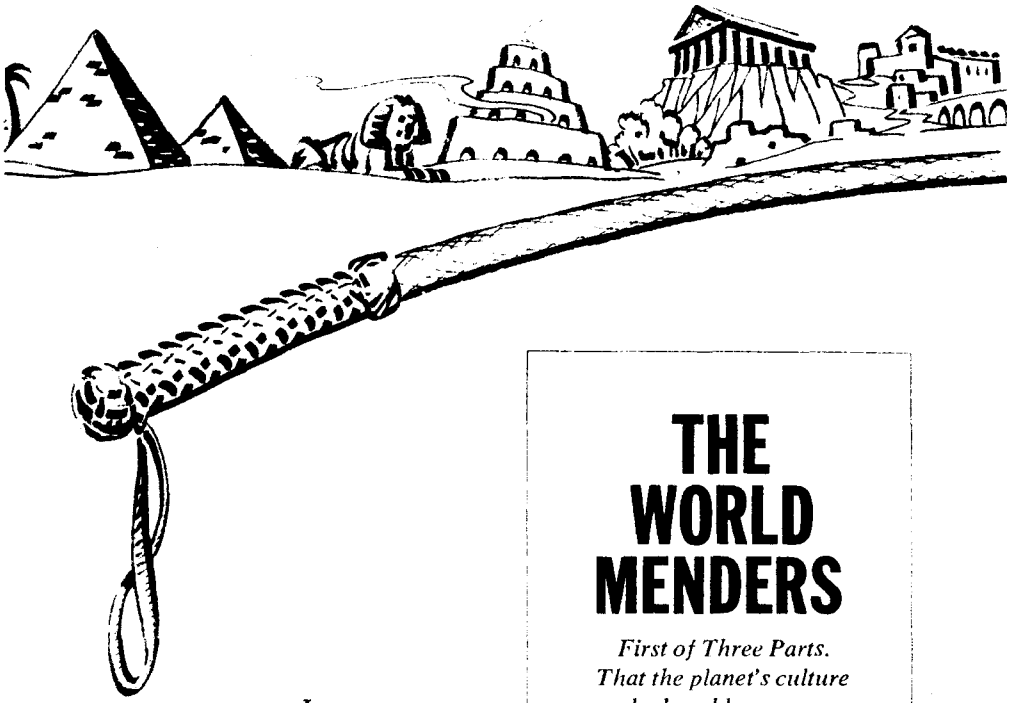

THE WORLD MENDERS

First of Three Parts.
That the planet's culture had problems was obvious—but finding out what the root nature of the problem was, so it could be cured, was NOT easy!

LLOYD BIGGLE, JR.
Illustrated by Kelly Freas

I

The captain himself escorted Farrari to the lighter and even carried one of his space bags for him.

He was a large, moody-looking man, this Captain Vaunn, and he had revolutionized Farrari's concept of a spacer. He went grimly about his business, said very little, and seemed as phlegmatic as a robot. In two months of chance encounters he had spoken directly to Farrari only once, and that when Farrari, to relieve the unrelenting boredom of space travel, took up a textbook, "Art in Rudimentary Societies," and spent several hours listening to the monotonous one-note scansions of primordial song. The captain knocked timidly, asked what the racket was, and, when Farrari explained, said almost apologetically, "Oh. We thought maybe you were sick, or some-

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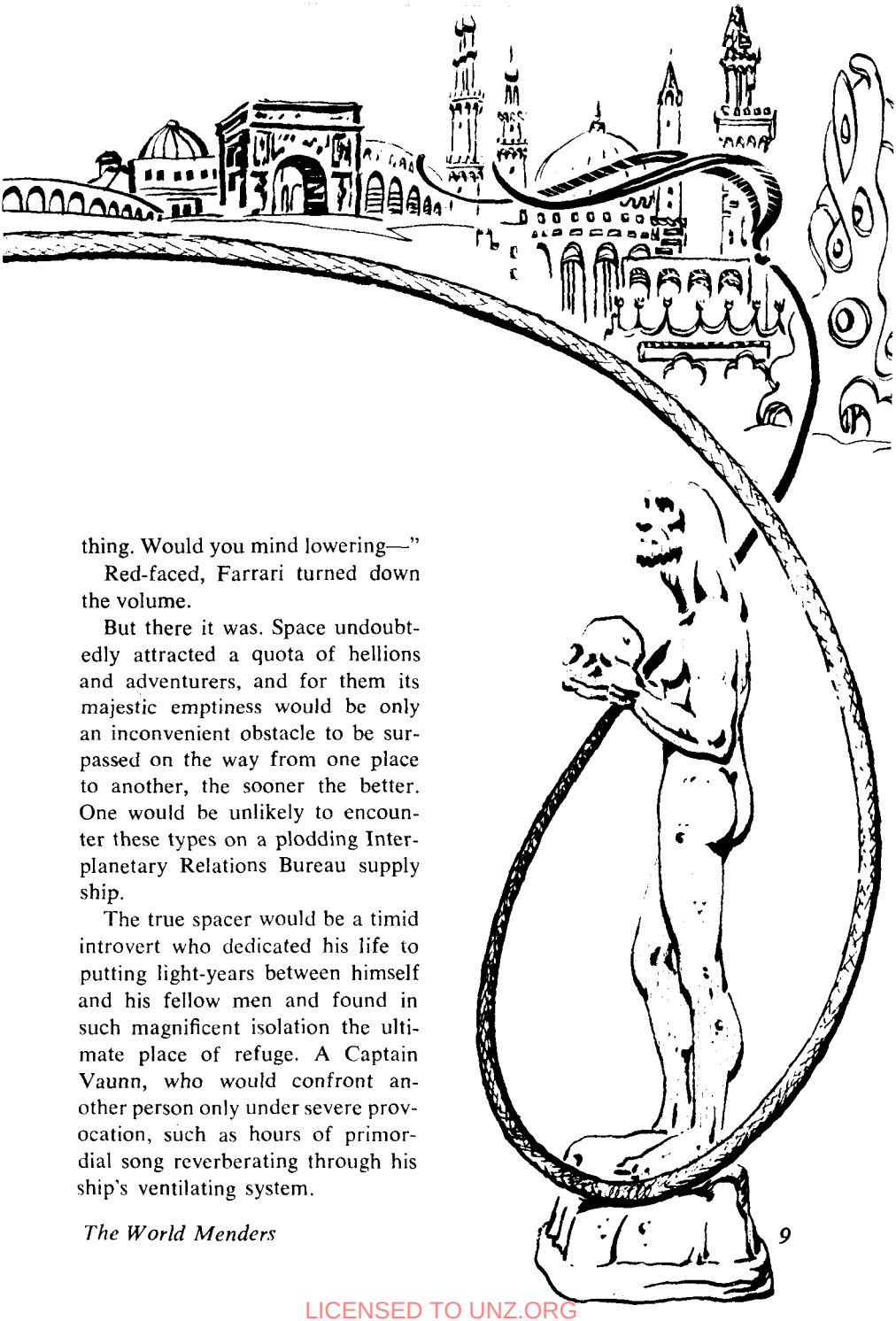

thing. Would you mind lowering—"

Red-faced, Farrari turned down the volume.

But there it was. Space undoubtedly attracted a quota of hellions and adventurers, and for them its majestic emptiness would be only an inconvenient obstacle to be surpassed on the way from one place to another, the sooner the better. One would be unlikely to encounter these types on a plodding Interplanetary Relations Bureau supply ship.

The true spacer would be a timid introvert who dedicated his life to putting light-years between himself and his fellow men and found in such magnificent isolation the ultimate place of refuge. A Captain Vaunn, who would confront another person only under severe provocation, such as hours of primordial song reverberating through his ship's ventilating system.

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He had not spoken to Farrari since then, and he did not speak now. He was present because etiquette demanded it, but plainly he would have preferred to remain in bed. He forced an embarrassed smile, his lips shaped a trite formula of benediction without uttering a sound, and he turned Farrari and his bags over to the mate and fled.

"Your last stop?" Farrari asked the mate.

"This is the last classification team. There are only survey and exploration teams beyond this."

He met Farrari's blank look with a polite smile, wished him a comfortable landing, and nodded to the lighter's pilot.

Farrari climbed aboard, and the pilot fastened his safety harness, tilted his seat for him, and announced, "Clearboard let 'er go." Girders of the hull flashed past on the screen, to be abruptly replaced by a dazzling curve of star-lit sky framing the enormous emptiness of the ship's black silhouette.

"All set?" the pilot asked.

Farrari nodded. The lighter's engines hummed thunderously, and they plunged downward.

It was nothing like Farrari had imagined it. He had watched twenty-nine departures, in which the lighter had been a gleaming dart on the ship's viewing screen aimed unerringly at the dark disks of twenty-nine different planets—watched enviously because the luck of the draw, or some unfathomable twitch of a computer, had given him the thirtieth and last assignment. Now that his turn had come he experienced only nausea and overwhelming disappointment.

Then the shadowy terrain dimly resolved itself into cragged, snow-capped mountain peaks softly awash with starlight, and the awesome loveliness of the view almost made Farrari forget his stomach.

The lighter braked crushingly. An opening yawned in a mountain peak, and they drifted into it and came to a hissing stop as the air lock clicked open. Farrari reeled forth with his space bags, which had abruptly acquired a staggering weight.

"Hello!" a voice rang out. "Who's this?"

"AT/1 Cedd Farrari," Farrari answered mechanically.

"Trainee," the pilot said, following Farrari from the lighter. "Didn't you get orders?"

"Probably. Not my department, you know. Graan is my name. Isa Graan. Base supply officer." He took one of the bags and crushed Farrari's free hand. A huge man, he towered over Farrari beaming down at him, his eyes alert and friendly under a crown of wildly bushy white hair. "Welcome home, fellow. It's a nice base, the coordinator is a good man, and this planet is certain to be oh-ohed indefinitely." He laughed. "You

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might call it a choice assignment. Not ideal, but choice. We're not under any pressure, and we haven't lost an agent in months. It's a good place for a train—hello! What the devil is that?"

He was staring at Farrari's collar insignia—the lute, scroll and palette of the Cultural Survey.

"I'm CS," Farrari said.

"What's CS?"

"Cultural Survey."

"What's Cultural Survey doing way out here? Damn it, fellow—you're lost!"

"Why don't you have someone on hand who knows what's going on?" the pilot asked irritably. "We've been dropping CS trainees everywhere between here and the frontier."

"You can't expect the whole base to turn out for one trainee," Graan said. "Got a copy of your orders, fellow?"

"In one of my bags," Farrari said. "I certainly *feel* lost, but if this is Branoff IV it's where I belong."

"Get the coordinator out of bed and ask him," the pilot suggested.

"Ha! How many times have you yanked your captain out of bed lately?"

"Clear it with somebody before my next load. If I don't make my getaway time, I'm stuck here for seventeen hours."

"I'll check," Graan said. He set down Farrari's bag and ambled away.

A work crew had opened the lighter's cargo hold and rolled a conveyor into position. The pilot handed over a bundle of manifests, and one of Graan's assistants began matching them with the crates that rolled down the conveyor. Farrari seated himself on one of his bags and waited stoically, ignoring the curious glances sent his way.

A tall, gaunt man strode into the room and stood watching. He wore a long mantle over a short, legless garment, and the vivid colors of his apparel were no less startling than his bare arms, which in spite of his slender body were incongruously muscular. Graan's assistant grinned at him. "Are you still here, Peter? I thought you left yesterday."

"I was due in Scorv last night," the other said disgustedly. "I had to wait for this dratted supply. Have my com relays turned up?"

"Haven't seen them yet."

"If they aren't here, someone is going to have to *make* some." His gaze fell on Farrari. "What do we have here? Trainee?" He strode forward and offered his hand. "I'm Peter Jorrul. Field team commander. What's your linguistic index, fellow?"

Farrari responded with a limp handshake. "Linguistic—index?"

Jorrul waved his arms despairingly. "What are things coming to? A trainee who doesn't even know his linguistic index!"

"He's Cultural Survey," the pilot

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said. "He wouldn't know a linguistic index from a classification ratio."

"Cultural Survey? *Here?* Does the coordinator know?"

"If he reads his mail he knows. We transported thirty CS trainees, and all of them had priority orders."

"Sounds like one of those sick jokes that the Psych Board keeps dreaming up."

The pilot chuckled. "No. Definitely not. Thirty CS trainees are no joke. Every permanent base in this sector got one."

"Then Supreme has had another of its periodic attacks of imbecility. I'm almost afraid to ask, but—why?"

"Why is a question you should learn not to ask. Invariably the answer is—why not?"

"Here's the manifest on your relays," Graan's assistant called. "They'll be down with the next load."

Isa Graan returned, grinning broadly. "Strunk heard something about a CS man being assigned here, so I guess it's all right."

"Does Strunk know why?" Jorrul demanded.

Graan shrugged. "No, and he wouldn't even try to guess. It's none of our business anyway—thank God! I'll sign for him. Welcome home again, fellow. Hope you like the place—you'll probably be here for twenty years—at least."

"Twenty years!" Farrari exclaimed.

"IPR assignments are permanent, except for command rank officers and specialists. Didn't they tell you? One year of leave for every ten years on station, and your travel time comes out of your year. If you make it as an agent, you'll probably save your leave time for retirement and then never retire. A lifetime just isn't long enough to learn a world well. But what am I talking about? You're CS, you're probably a specialist. Sam—look after the trainee."

One of the workmen stepped forward and picked up Farrari's space bags.

"He'll find you an unused room with a bed," Graan said. "You won't need more than that before morning. The coordinator will assign you to quarters when you present your orders and sign in. We operate on a twenty-seven hour day. Is your watch adjustable? See me in the morning, and I'll issue you one that is. Breakfast is at seven. Sam will show you the dining room. Breakfast is come as you like, lunch is a package of rations whenever duty permits, dinner is dress uniform if you feel like socializing, or a tray in your quarters if you don't. On this base you're entitled to as much private life as you can manage provided you get your work done. See you tomorrow."

Dazedly Farrari turned to follow Sam.

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Jorrul moved to intercept him. "I want you to understand one thing, fellow. I don't know what your status is, or what you're doing here, and as long as you stay on base I don't care. Take one step away from here and you'll be my responsibility—and I'm not having any of it. You're under permanent restriction, and, if you have a passion for sightseeing, you're to do it on a viewing screen. Is that clear?"

"Yes, sir."

Sam led him along a wide, arching, plastic-lined corridor, pointing out the dining room as they passed it, and finally turned off into a smaller corridor that appeared to be unused. He looked into several empty rooms before he found one that contained a bed and nothing else. It was a cold, windowless cavity cut into the mountain's blue-veined granite. Sam hurried away and returned with a bellowing sleeping bag.

"There's no heat in this section," he said, stating the obvious with engaging apology. "But it's just for tonight. This should keep you warm enough."

"I'll make out all right," Farrari said. "Thank you."

Sam departed with a nod and a grin, and Farrari stepped to the wall to examine a framed motto that hung there. DEMOCRACY IMPOSED FROM WITHOUT IS THE SEVEREST FORM OF TYRANNY. He shrugged and looked doubtfully at the bare room. "Home?" he exclaimed. The word echoed.

But he slept well—slept until the coordinator sent for him, and he missed breakfast.

II

He was twenty years old on the Adjusted Galactic Time Scale—a pleasant, well-mannered young man with an eminently proper upbringing, better than average intelligence, and a rich diversity of small talents. He considered it his own personal misfortune that his father was assistant custodian of the Cultural Survey Archives and his older brother a promising young officer already storming the lower reaches of CS administration. His family took it for granted that he would attend the Cultural Survey Academy; he went without protest, but only because the possible alternatives pleased him even less.

He quickly learned that in the Cultural Survey the man with many small talents possessed a marked advantage over the man with one or even several large ones. He ranked number two in his class, his family was pleased, and he began to think of the Cultural Survey as a career rather than a place to mark time while he cast about for something more important with which to occupy himself.

Abruptly the Academy's entire fifth-year class was transferred,

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without warning, explanation or apology, to the Interplanetary Relations Bureau, a mysterious governmental department that few of the trainees had known existed. Their AT/1 shoulder patches crinkly new, their space bags bulging with 24.9 kilos of books and training manuals covering the subject matter of the two years of advanced training now forever lost to them, they were summarily transported far beyond the jagged frontier of the Federation of Independent Worlds and deposited on planets whose existence all the available reference books denied.

The sudden transfer shattered Farrari's inner complacency. He entered upon his new duties with numbing uncertainty, with bewilderment, with an apprehension of starkly revealed ineptitude and its accompanying throes of exquisite embarrassment. In a word, he was terrified.

He discerned immediately that the base staff had its own strict orders concerning Cultural Survey AT/1 Cedd Farrari. On the first morning he found himself the master of a centrally-located, two-room suite just off one of the main corridors. The living quarters were comfortably furnished; the large workroom was bare, but Isa Graan, the base supply officer, lined its walls with shelves and teloid files, ceremoniously presented Farrari with the latest model teloid projector, and invited him to the storage rooms to pick out any other furnishings he wanted. Ganoff Strunk, the amiable, portly, bald-headed records chief, brought him an initial allotment of five hundred teloid cubes of cultural subjects that he had culled from his files and then returned to unload an astonishing collection of artifacts: carvings in stone and wood, exquisite examples of metalcraft, jewelry, embroidery, leather work, weaving, drawings and paintings on wood and cloth, ceramics—the room took on the aspect of moving day at a museum.

When finally Farrari was left alone he slowly circled the pile of art objects, touching, scrutinizing. He was awed and delighted but also confounded. Here was a new world to explore, to study, to classify. Novice that he was, he hadn't any idea how to begin.

Someone strolled along the corridor, and Farrari frowned resentfully at the fading footsteps. Workrooms were connected with the corridors by wide, doorless arches. Though one was entitled to as much private life as he could manage, it was obvious that his work was everyone's business.

Thoughtfully Farrari made another circuit of the room. It would take him days just to impose a semblance of order, and once he had submerged himself in the task of sorting and classifying he would have little thought for anything else. Before he became too pre-

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occupied to care, he should at least learn to find his way about the base.

Resolutely he turned away and stepped into the corridor.

The base was weblike, and at its center its main corridors intersected in a miniature rotunda. Opening off from it were the dining room, which also served as an assembly room on the rare occasions when the full staff met, Ganoff Strunk's records section, and the administrative offices. Around the rotunda's circumference was a bulletin board posted with a scattering of notices. He passed them by without a glance—they could not possibly have concerned Cultural Survey AT/1 Cedd Farrari. At the end of one corridor he could see Isa Graan's storage rooms and the hangar where the lighter had landed. He turned in the opposite direction.

He met no one, but several staff members looked up from their work and nodded as he passed. All identifying marks were given in the abstract glyphs of a native language, and the query about his linguistic index took on an ominous significance. Obviously IPR personnel were encouraged—nay, *forced*—to master native languages.

The corridor ended in a row of small conference rooms, each with a single window that looked out onto formidable mountain scenery. Backtracking, Farrari took several turnings and was about to give himself up as lost when he abruptly happened onto a main corridor again. Passing through the rotunda a second time, he paused to look at the posted notices.

Some were questions. Some were lists of native words, the strange glyphs followed by a rendition in the common alphabet and a question mark. Some were cryptic comments.

"*Yilesc?* See me. Prochnow."

"Every member of a family of *olz* in the village coordinates 101.7/34.9 has seven fingers on each hand. Brudg."

"This week's luncheon menu: *forn* cakes, *narmpf* stew, jellied *zrilmberries, zrilmberry* tea. Dallum."

"Where did the pink marble in the *kru*'s summer palace in the *narru* come from? Wedgor."

At the top of a long sheet of paper: "List any comparatives you've encountered in *ol* and *rasc* languages." The remainder of the sheet was blank.

"Wanted: tri-bladed dagger, any condition. Kantz."

"Anyone seen a red *lupf* growing *south* of Scorv? Dallum."

A voice said tremulously, "I was a *yilesc.*"

Farrari whirled and gaped at the speaker. The young woman—girl, really—was of slight build, with a small, childlike face and large black eyes that fixed gravely upon his

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face and saw something in a remote dimension. Her small form was clothed in a work smock and trousers, both of them much too large. Farrari wondered if she were a child and the base had no clothing that would fit her.

"That's very interesting," he said, looking at the notice again. Her searching eyes disturbed him. "What's a *yilesc*?"

She laughed softly. "They don't know. Not even the *yilescz* know. And I won't tell them!" She continued to gaze unblinkingly at his face. "I haven't seen you. You're new."

"I arrived last night," Farrari said. "I'm from Cultural Survey."

"You made a statue. And cut yourself."

"How did you know that?"

She laughed again.

Farrari was frankly looking for an excuse to escape when Ganoff Strunk hurried by. "Liano!" he called. "Did you find the coordinator?"

"Oh," she said dully. "The coordinator." She darted away.

"Out for a walk?" Strunk asked Farrari.

He nodded. "What a strange person!"

"Yes. Getting familiar with the base, are you?"

"That was the idea, but I keep losing myself."

"Come over to the office and I'll give you a floor plan. The notices? They're so someone won't spend weeks tracking down a fact that someone else already knows. The words are mostly posted by the lexicographer. That is, if anyone has a question about a word he goes to see her, and if she can't answer it the problem is automatically hers."

"That girl . . . Liano, is that her name? She said she was a *yilesc*. Is she IPR?"

Strunk nodded.

"How could she be a *yilesc* when you don't know what a *yilesc* is?"

"We know," Strunk said. "We've had several *yilesc* field agents. What we don't know is how the *yilescz* got to be what they are, or why. Jan Prochnow is our expert in comparative theology, and because the *yilesc* is a kind of female shaman he'd naturally like to know the how and the why. It only goes to show that knowing the definition of a word sometimes poses more problems than it solves. That notice has been posted for a long time."

They walked toward Strunk's office, Strunk talking about various research and study projects and Farrari only half listening. As Strunk handed him the copy of the base floor plan he ventured to put his mystification into words. "This . . . Liano—"

"Liano Kurne," Strunk said.

"Is she some kind of seeress, or clairvoyant?"

Strunk had started toward his desk. He turned on Farrari and de-

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manded, *"Why do you ask that?"*

"Something she said to me—"

Strunk gripped his arm. *"What did she say?"*

"She described something that happened to me a couple of years ago," Farrari answered lamely. "I've never been much good at sculpture, and one day in class my chisel slipped and gave me a nasty cut. She said, 'You made a statue. And cut yourself.' There's no possible way she could have known that, but she did."

Strunk released Farrari, backed slowly toward his chair, and seated himself with exaggerated deliberation. "I see. That's very interesting. Peter Jorrul will be glad to hear it. We've been worried about Liano. A year ago she and her husband were working as a team down south, and her husband was killed. She's never recovered."

"She looks so *young*."

"She is young. Her husband was young." He added defensively, "But that's when we have to place them, if they're to survive in a completely alien environment. It's the young agents who are the most adaptable."

"Does the IPR Bureau Academy accept children?"

"In special cases, yes."

Farrari returned to his workroom and began sorting art objects and arranging them on shelves. Some time later he glanced up and saw Liano Kurne watching him from the corridor. She darted away, and though after that he frequently encountered her in the corridors, she never seemed to recognize him.

Farrari studied Branoff IV's arts and crafts, pondered its rudimentary literature, listened to its music. He created classifications and wrote reports. The staff gave him everything he asked for, some things he would not have dared ask for, and a few things he did not want.

To his astonishment he found himself treated, not merely as an equal, but as an important equal. His entire professional existence had been devoted to routinely polishing the cultural boots of his instructors. Suddenly he was translated into a situation where his casual whim was everyone's command, where his opinions were energetically sought after, and where, at conferences that touched on cultural matters, his colleagues could be surprised watching him curiously, as though in hope of catching him practicing a parlor trick.

It was all very unsettling, because the base staff obviously was as mystified about the presence of a Cultural Survey trainee as Farrari was to be there. On the infrequent occasions when he managed to wrench himself away from his work, he paced the plastic-lined corridors of the comfortable aerie that the IPR Bureau had bored

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into the mountaintop, wondering just what it was that he was supposed to be doing.

He made friends. Anyone would have made friends at this base, where the doorless workrooms invited a constant influx of visitors who familiarly looked over one's shoulder, examined work projects with interest, and asked questions. When he walked through the corridors he was likely to be hailed at any door, asked what he thought of something or other, and invited to share a ration package.

His most constant visitor was old Heber Clough, whose workroom was across the corridor from Farrari's. An elderly wisp of a man with a mischievous, cherubic face ringed with thinning red hair and the faint red fuzz of a sparse beard, he came stumbling into Farrari's workroom on that first afternoon, when Farrari was despondently studying a teloid projection and wondering how he should begin.

"Getting organized?" Clough asked.

"Ha! I should start classifying this stuff, but I don't have a single reference base." Farrari fed another cube into the projector. "These bas-reliefs are excellent, but I don't know whether they were produced yesterday, or a thousand years ago."

"Oh, well," Clough said. "If that's all that's bothering you this one is a carving of the *kru*, Feyvt, and his family. He was the grandfather of the present *kru*, and here he has"—Clough pointed a stubby finger into the projection and counted—"seventeen children; that would date this carving at a hundred and sixty-two or a hundred and sixty-three years ago. I'd have to check my records to say which. Those are Branoff IV years."

"How do you know?" Farrari exclaimed.

Clough beamed at him. "I'm a genealogist. I know the *kruz* as far back as we've found records. These carvings are as exact as photographs."

"That's wonderful!"

"Not quite as wonderful as it might be," Clough said gloomily. "Take a close look at the children."

"They all look like their father."

"They all *are* their father. It's some confounded artist's tradition. A child, of either sex, is always wearing a miniature of its father's face. Then when the children leave their father's home and become adults in their own right, it's all but impossible to figure out who they are. It makes a pretty problem for a genealogist—a *pretty* problem." He shrugged and added cheerfully, "But I know all the *kruz*. If you need some kind of temporal guide for classifying art styles, you couldn't find a better one than that. If you have any questions about them, just ask me."

The walls of Clough's own workroom were covered with

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charts, which had, unfortunately, a great many blank spaces. His cherubic countenance would go wide-eyed with fascination over the discovery of a new genealogical detail, however minor.

Branoff IV's aristocracy was a relatively small, tightly-knit group, and IPR had been unable to work agents into it, or even close to it. In Clough's most critical area of study, the potential heirs to the throne, he was stymied because no one knew for certain whom they might be. The old *kru's* reign antedated IPR on the planet, and the field team had not yet had an opportunity to observe a succession. Clough was delighted when Farrari proved, with bits of a literary epic, that the throne did indeed descend to one of the *kru's* sons.

"I assumed as much," he chortled. "Oh, yes indeed, I assumed it. It's so common that one always assumes it. But one of the first things one learns in IPR is that assumptions do not go into reports. One records them in a workbook until there are sufficient facts to support them. Now suppose you tell me who the present *kru's* sons are and which of them is the most likely heir apparent."

Farrari failed on both points, but he was able to fill in several of Clough's blank spaces from the results of his careful study of the amazingly graphic temple bas-reliefs. He also succeeded in identifying an elder brother of the *kru*, thus proving that the throne did not inevitably go to the oldest son, and that discovery forced Clough to dejectedly rip a page of assumptions from his workbook.

But the old man was tremendously pleased, and he often brought his lunch to Farrari's workroom so that the two of them could study Branoff IV art while they ate and attempted to establish blood relationships through physiognomical similarities.

Adjoining Farrari's two rooms was the huge laboratory of Thorald Dallum, a young botanist. Branoff IV plants flourished there under a blaze of artificial sunlight. Farrari, unaccustomed to confinement, found the vast dimensions and gardenlike atmosphere a welcome relief from the relentlessly impinging walls of rooms and corridors, and he quickly seized upon the excuse of identifying trees and plants portrayed in Branoff IV art and began to visit the place daily.

Dallum offered a weekly luncheon at which he served dishes he had concocted from Branoff IV plants. He was attempting to discover new sources of food, and many of his concoctions were derived from plants that the natives did not recognize as nutritious. Unfortunately, neither did the base personnel who came to eat them. They cautiously accepted small servings and sampled them in the manner of a person who had been

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ordered to discover by oral ingestion the lethal dose of a known poison, while Dallum hovered nearby scrutinizing their faces anxiously. His luncheons were not well attended. His own special favorite among these exotic dishes was *zrilmberry* tea, and he enthusiastically recited the long list of nutrients that it contained. Farrari was not surprised to learn that no native had ever been known to eat a *zrilmberry*. And the tea tasted dreadful.

Dallum had scarcely been aware that Branoff IV possessed an art. He was eager to assist Farrari, and in time he began to confide his own problems.

"The main trouble," he said despondently, "is that the agriculture can't support the population. Branoff IV grains and tubers are the most miserable excuses for food plants that I've ever encountered. The *olz* live out their lives on the verge of starvation, and very short lives they are. If only I could develop some strains that produce more food . . ."

"Olz?"

"Slaves."

Farrari found for him the teloid of an ancient carving of a *kru* inspecting a grain field, and Dallum gazed at the projection dumfounded. "There are five times too many ears!" he exclaimed. "It must be artistic license!"

"That's possible," Farrari said, "but in everything I've been able to check, the realism is superb."

"How old is it?"

"Roughly a thousand years."

Dallum moved the projection closer to his specimen plants. "At least five times too many. I've never heard of a situation where the inherent productivity of a food plant deteriorated so drastically. The soil, yes, but a people will learn to use fertilizers, or rotate their crops, and very early they learn that the seeds of a healthy, high-yielding plant produce more food than the seeds of a low yield, deformed plant."

"Does the present *kru* inspect many grain fields?" Farrari asked.

Dallum thought for a moment. "I've never heard of him inspecting anything."

"The historians believe that long ago the aristocracy was much more concerned with practical affairs. The art and literature that survives supports that conclusion. Down through the centuries the aristocrats gradually lost interest in everything except their own pleasures."

"I see," Dallum mused. "And one couldn't expect intelligent agricultural management from a starving *ol*. He'd be too much in a hurry to eat to pay any attention to plant heredity. If for centuries these people have been eating the best grain and saving the worst for seed, it may take much longer than I'd thought to breed plants with a decent productive capacity."

"Why don't you import some?"

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"Ha! Read your IPR field manual lately?"

"I don't have a field manual."

"You're the lucky one," Dallum said with a grin.

The other inhabitant of Farrari's corridor was Semar Kantz, a military scientist and a devoted student of the *kriis* army and its tactics. Kantz had a vast collection of teloids of art works depicting weapons and soldiers and battles. Working together, the two of them arranged these in chronological order, Farrari classifying according to art styles and techniques and Kantz according to weapon types and shapes and tactical formations. Both were startled and delighted at the ease with which their respective specialities dovetailed.

Farrari was enjoying himself and keeping furiously occupied, but as the months slipped by uneventfully he became increasingly concerned that he was somehow failing to fulfill his assignment.

"How do you study an IPR problem from the Cultural Survey point-of-view?" he asked Heber Clough.

Clough regarded him with astonishment.

"That's what my orders say I'm to do," Farrari explained, "and I don't know how to go about it."

"What do you think you've been doing?" Clough demanded. "You've been looking at all of our problems, and if it hasn't been from the Cultural Survey point-of-view I don't know what you'd call it. Didn't your academy give you any suggestions?"

Farrari laughed bitterly. "At the academy no one had the vaguest notion as to what IPR wanted with us. There's this deadly tradition that every cadet must have a personal interview with the commandant on promotion day. You walk in and salute, and the commandant says, 'Congratulations, Cadet Blank. Your work this past year has been excellent.' Or 'good' or 'satisfactory' —if the work hadn't been satisfactory the cadet would have been informed earlier, in an entirely different kind of interview. 'You are promoted one grade and for the coming year you are ordered to this academy to continue your studies. Are there any questions, Cadet Blank? *Dismissed!*' "

Clough laughed heartily. "It sounds hauntingly familiar, except that at the IPR Academy we also had to listen to a restatement of the academy's position on overnight passes."

"Anyway, my class was lined up and waiting for the interviews to start, and suddenly the commandant walked out looking as if the Cultural Survey had been abolished and announced that we'd all been promoted and transferred in rank to the Interplanetary Relations Bureau for assignment as the Bureau directed. He couldn't tell us why, or what IPR expected of us, because no one had bothered to in-

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form him. We shipped out four hours later. Most of the four hours was spent in figuring how to include a two-year issue of texts and manuals into the fifty kilograms of luggage we were allowed, it being fairly certain that we'd be working a long way from a CS reference library. I did manage ten minutes of research because I wanted to find out what the IPR Bureau was."

"Did you succeed?"

"No. It is alleged to have the largest annual appropriation of any governmental department—which I believe. My transfer in rank doubled my salary. Other than that, it functions only outside the organized territory of the Federation, and no one seems to know what it does there."

"It was once the most important agency of the Federation government," Clough said. "When relations between worlds became a matter of routine regulation instead of heroic improvisation it faded into insignificance—within the Federation. Outside Federation boundaries it runs the galaxy and maybe the universe, too, to whatever extent the universe condescends to take notice of it. Put in simplest terms, IPR is the sole link between the Federation and any world that isn't a member, and its most important function is preparing nonmembers for membership."

"That's what I'd concluded. None of it helps me to figure out what *I'm* supposed to be doing."

"Has the coordinator said anything to you?"

"No. I haven't talked with him since the day I signed in."

"Believe me, if he had any complaints you would have talked with him," Clough said fervently. "The more Coordinator Paul leaves a man alone, the better the job he's doing. If you have any doubts about your work, why don't you ask him?"

"It seems like an awfully silly thing to be bothering the coordinator with," Farrari said.

But more days passed, and finally Farrari could contain his uncertainty no longer. He humbly went to see the coordinator.

III

Ingar Paul, a large, untidy man with a brilliantly tidy mind, greeted Farrari cordially, placed a chair for him, lit up a monstrous, hand-carved pipe—both artifact and habit were souvenirs of a primitive society he had once worked with—and sat back to compose himself for whatever problems the Cultural Survey trainee aimed at him.

Farrari allowed his gaze to linger briefly on the framed motto that hung on the wall just above the coordinator's head. DEMOCRACY IMPOSED FROM WITHOUT IS THE SEVEREST FORM OF TYRANNY.

Paul exhaled gently. "Well, Farrari?"

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"I have a confession to make, sir—though it probably won't be news to you."

Paul smiled. "Confession is said to be healthful. I'm no authority on that, because to tell the truth I don't often get to hear one. What do you want to confess?"

"I can't figure out what it is I'm supposed to be doing."

Paul's smile broadened.

"My orders say I'm supposed to study IPR problems from the CS point-of-view," Farrari went on.

"I know."

"What does that mean?" Farrari demanded, momentarily forgetting his lowly AT/1 rank.

Coordinator Paul took no offense. "I have no idea what an IPR problem would look like from the CS point-of-view."

"I don't know what an IPR problem looks like, period," Farrari said. "I've listened carefully to everything that goes on at the conferences, and talked with your specialists as much as I could, and it doesn't seem to me that you have any problems. Unanswered questions, yes, but not problems. You're just collecting information, and organizing it and studying it, and I suppose when you've finished someone will give this planet a classification number and that will be the end of it. Any problems you had were solved long before I came here."

"Yes," Paul murmured. "Yes—and no." He continued to puff thoughtfully on his pipe. The silence lasted so long that Farrari became uneasy. "Yes—and no," Paul said again. "I'd say that you've made yourself very useful here, Farrari. You've relieved the classification team of the necessity of writing reports on cultural matters—which has always been a headache. IPR men lack the training and interest. Your analysis of art by historical epochs was of tremendous assistance to the history section and to several other projects. Likewise your correlations of myths and literature with historical events. Several specialists are downright lyrical in their praise of the help you've given them. You've shown us that culture is a sort of common denominator to a great many areas of study, and in doing so you've made some highly valuable contributions."

Farrari modestly murmured his thanks.

"I polled the entire classification team a month ago," Paul said. "No one disapproved of your presence here, everyone thought the assignment of a CS man to an IPR team a good idea, and many were enthusiastic. You've done a job for us, you haven't got in anyone's way, and you've worked harmoniously whenever the interests of another specialist touched upon yours. I've said some nice things about you in my reports, and I expect to say more before you're recalled. In

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short your worries, if you have any, are entirely without foundation."

"Even so," Farrari persisted, "I have the feeling that someone expects me to do something . . . something—"

"Significant?" Paul suggested. "Or maybe even dramatic?" He chuckled. "Ever hear of a world named Gurnil?"

"No, sir."

"I'm surprised. Where IPR is concerned there is always a problem—*THE* problem. On Gurnil it went on for four hundred years. Then someone had a brainstorm and brought in a CS officer. Prior to that we'd always kept CS out until we'd certified a world nonhostile, meaning until it was eligible for Federation membership. The CS officer solved the Gurnil problem with a brilliant stroke that the Bureau doesn't understand yet and probably never will. Immediately the Bureau requested CS men for all of its classification and direction teams. There weren't enough to go around, which is why your class was jerked out of the academy before it finished its training. Bureau higher-ups are hopeful that Gurnil-type miracles will pop out all along the frontier. They won't. The CS officer who solved the Gurnil problem was undoubtedly a veteran and the most brilliant man available. You youngsters aren't about to pull off anything like that, but you can learn, you can acquire valuable experience, and you can help out with routine tasks that touch on your specialized knowledge. If once in a century, or once in a millennium, we get another Gurnil, that's just an unexpected bonus. My advice: carry on as you have. You're doing fine."

"Thank you, sir. But what is *THE* problem?"

Paul's fingers drummed thoughtfully on his desk. "Didn't they issue you an IPR manual?"

"No, sir."

"They should have." He scribbled a memo and handed it to Farrari. "Take that to Graan. If he doesn't have a manual in stock I'll be shocked, and tell him he's to loan you his personal copy until he gets one for you."

"Thank you, sir."

"One moment, Farrari. Manual 1048-K is a mountain of fine print and capitalized nuggets of what the Bureau chooses to consider wisdom. I'm not giving you one with the idea that you'll read it, because you won't. At least, I hope you won't. The contents are highly technical, and it takes a Bureau man several years to work his way through it. A little browsing in it won't injure you—not much, anyway—but while you're browsing never forget one thing: the entire manual concerns the Bureau's dealings with *people*—with intelligent beings. That's all, Farrari."

Dazedly Farrari saluted and made his exit.

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In Isa Graan's office he exchanged his memo for a copy of IPR Field Manual 1048-K. It was a thick, oblong volume of some three thousand pages, zip-bound in tough, reinforced covers.

"So you think you're ready for the Holy Word," Graan drawled. you're agreeing not to remove the manual from this base without the coordinator's permission, or divulge its contents or any part thereof to any unauthorized person or persons."

"What's the penalty?"

"No idea. As far as I know it's never happened."

Farrari scrawled his signature. "I'm not sure that I'm ready for quite this much of the Holy Word," he said ruefully. "I suppose you people have to memorize it."

"It only seems that way," Graan said.

Farrari opened the cover. On the first inside page he read, "DEMOCRACY IMPOSED FROM WITHOUT IS THE SEVEREST FORM OF TYRANNY." He glanced at the wall behind Graan, where the same motto hung. "It just occurred to me," he said, "that thing is on display in every room in the base—except my rooms."

"Regulations say every room," Graan said. "It kind of seemed that we were turning your rooms over to the Cultural Survey, and we didn't know but what CS had a motto of its own, so we took ours down."

"I see." Farrari turned a handful of pages and peered dubiously at the fine print. He flipped another page and saw a framed block of large, black capital letters. DEMOCRACY IS NOT A FORM OF GOVERNMENT. IT IS A STATE OF MIND. PEOPLE CANNOT BE PLACED ARBITRARILY IN A STATE OF MIND.

"I don't suppose there's an abridged version," Farrari said wistfully. He turned another handful of pages. ONE MEASURE OF THE URGENCY OF REVOLUTION IS THE FREEDOM THE PEOPLE HAVE, COMPARED WITH THE FREEDOM THEY WANT.

"It's very carefully organized," Graan said. "Here—the table of contents is at the back. History of the Bureau, Basic Principles, Classification Data, Specimen Cases—that's half the manual, includes all the classic cases and representative examples of every classification. Then Procedures, and so on."

"Where would I find instructions for classifying this planet?"

Graan patted the manual. "Actually, this is classroom stuff. I doubt that any IPR team has to calculate a classification ratio these days. We send all of our data to headquarters, it's fed into a special computer, and someone reads off the classification. The ticklish problem is in compiling the data—not to overlook anything. In simple

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terms, the classification is political factors over technological factors. It reads like a fraction. The smaller the fraction, the healthier the situation—what we call a low-high condition—and with proper evolution the technological factor ascends and the political factor descends. One over one hundred would mean pure democracy and the higest technological level. The computer rarely gives us whole numbers, though—1.3785 over 99.7481 would round off at 1/100 for convenient reference."

"What about Branoff IV?"

"It'll be the opposite—a nasty variant of a high-low condition. The God-Emperor, a small class of intermarrying nobility, military establishment mainly aimed at keeping the population in check, and the majority of the emperor's subjects in a state of slavery. Politically somewhere in the high eighties. Considering the level of culture the technology is surprisingly weak. Not even ten on the revised scale—say 87/8. The Bureau is certain to oh-oh the planet."

"What does that mean?"

"Observation only. It'll be at least a couple of millennia before we really can go to work here."

"And what is the Bureau's problem—*THE* problem?"

"Our *mission*," Graan said slowly, "is to raise the technological level, and to reduce the political factor to a point where all of the population can benefit from the technological advances. Ultimately, to achieve a minimal level then democracy, which would make the planet eligible for Federation membership. *THE* problem, from which all of our other problems derive, is that this must be achieved by the people themselves. History has recorded many instances where outside forces have artificially raised a level of technology and imposed a democracy on a population. The result is inevitably catastrophic. Democracy imposed from without—"

Farrari groaned.

"Something similar could be said for technology imposed from without," Graan went on. "*THE* problem is to somehow move the people toward the achievement of these things by themselves, without any apparent outside intervention. This means that the Bureau has to work with the local population completely unaware of its existence. If its presence is so much as suspected, it must withdraw for years, maybe centuries, and then make a fresh start. Needless to say, the Bureau proceeds cautiously in even its small endeavors. *THE* problem is never exactly the same twice, because intelligent beings are so damned inventive. That's why the manual is so thick—why there are so many specimen cases. What works wonderfully well on one world may not work at all on another where conditions seem to be similar. The first thing an IPR man

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has to learn is that he's dealing with people, and people can be confidently relied upon not to conform to any preconceived pattern."

"Coordinator Paul just told me something like that."

"Then that makes it official," Graan said with a grin. "You'll also find it mentioned once or twice in the manual."

Farrari carried the manual to his quarters and flopped down on his bed to read. The contents seemed either distressingly boring or appallingly technical, and the fine print quickly gave him a headache. For a time he amused himself by flipping the pages rapidly and reading the succinct messages that flashed at him in capitals.

THE BUREAU DOES NOT CREATE REVOLUTION. IT CREATES THE NECESSITY FOR REVOLUTION. GIVEN THAT NECESSITY, THE NATIVE POPULATIONS ARE PERFECTLY CAPABLE OF HANDLING THE REVOLUTION.

FUNDAMENTAL TO ANY DEMOCRACY IS THE PEOPLE'S RIGHT TO BE WRONG. NO DEMOCRACY HAS SURVIVED THE ABOLISHMENT OF THAT PRINCIPLE.

DEMOCRACY HAS BEEN TOUTED AS A SYSTEM UNDER WHICH ANY MAN CAN BE KING. SUCH A SYSTEM WOULD NOT BE DEMOCRATIC, BUT ANARCHIC. IN A DEMOCRACY, NO MAN CAN BE KING.

. . . OF THE *PEOPLE*, BY THE *PEOPLE*, AND FOR THE *PEOPLE* . . .

Farrari zipped the covers and pushed the manual aside.

PEOPLE. All of these words concerned intelligent beings who were born, attained maturity, loved, or through some related process, reproduced their kind, tasted joy and sorrow, health and sickness, and died, thus advancing their civilizations a fractional point up the technological scale and down the political scale. Or perhaps, in one of the retrogressions that must occur, sending it stumbling in the wrong direction.

PEOPLE.

In Farrari's intensive studies at the Cultural Survey Academy he had learned to analyze and evaluate and classify any work of art set before him. He had plodded wearily, but efficiently, through kiloreams of prose and poetry, and kilohours of music, and kilometers of art and architecture with no more than a passing thought to the minstrels and writers and poets and musicians and painters and sculptors and architects who created those things.

He had given no thought at all to the people for whom those works of art were intended. It was occurring to him for the first time that the art of the universe had not

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been called into being solely for the study and diversion of the Cultural Survey. The aspiration and sense of beauty of living beings—of *people*—were the generative impulse behind each word, each note, each stroke of the brush or chisel.

Just as human perspiration and blood throbbed behind each casual statement of the word *revolution* in IPR Manual 1048-K.

This world of Branoff IV. Farrari had seen one class of its inhabitants every day since his arrival. He had seen the emperor, or *kru*, and his little coterie of nobility portrayed in bas-relief sculpture of a surprising strength and maturity. He had seen the valiant deeds of the *kru's* warriors—who were not so much an army as an elite palace guard—depicted in sculpture and painting, celebrated in legend, praised in song.

What of the *people?*

He searched his memory. He had hundreds of teloid cubes in his workroom files, neatly cataloged and instantly available to project a three-dimensional time image with natural color and sound. Every palace and temple had been meticulously photographed in all of its rich detail: its masterful bas-reliefs; its wall paintings—which were stylistic monstrosities because the paints were of poor quality and the paintings had been continuously restored and touched up by successive generations of artists; its lovely tile friezes; its tapestries; its bungled attempts at full sculpture—which continued to puzzle him because the relief carving was so excellent. He had teloids of carved and etched weapons, of ceramics, of jewelry and ornaments, of illuminated scrolls, even a teloid of one of the hand-painted robes that were ceremoniously burned after the *kru* had worn them once. He had more than a hundred teloids of the exterior details of the *kru's* Life Temple and its astonishing Tower-of-a-Thousand-Eyes that he had unhesitatingly classifed as unique, to the undisguised amusement of Jan Prochnow, the expert in comparative theology. ("It's only a minor variant, my boy, and a rather naïve one at that.") He had teloid cubes of every kind of art, ornamental, or practical, and as many specimens as the IPR field team had been able to surreptitiously ferret out for him, and he had been studying them for months. He had not even been aware of the existence of a *people*, of the masses of intelligent beings that those thousand eyes of the *kru's* tower stared out upon. Did they pass by quickly, with lowered gaze, or did they pause and boldly stare back?

Suddenly he wanted to know.

He sprang from his bed and hurried to the records section. "I'd like to take a few teloids," he announced.

Ganoff Strunk hauled himself from behind his desk, an ex-

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pression of wounded dignity on his lined face. "Did we miss something? I thought we gave you *everything.*"

"You did," Farrari assured him. "I'd just like to take a few teloids of the slaves."

"The *olz.* Yes. What do you mean—*you'd* like to take a few teloids?"

"Well—"

Strunk clutched his ample belly and laughed convulsively. "You think all you have to do is walk up to an *ol,* point your camera, and say, 'Smile'? See here, my boy, as far as the *ol* is concerned, you are a *thing,* from the *nether regions,* and don't ever forget it! Before you can approach a native you have to *be* a native—in dress, mannerisms, speech and character. What role would you take? Slave, overseer, soldier, artisan, merchant, priest, nobleman—why, you couldn't walk along a city street without getting yourself stoned as a degenerate! You don't even know which finger the well-bred *ol* uses to pick his nose. The first time you sneezed in the presence of a *durrl,* a slave overseer, you'd be executed for insubordination. Nobody—and I do mean *nobody*—gets close to a native until he's been exhaustively trained and strenuously examined. Even so, we lose agents. Especially on planets such as this one we lose agents, because life is held in such low esteem that a soldier will likely as not run a spear through the first *ol* he meets of a morning just for practice, or the general hell of it. We lose them, but we certainly don't throw them away."

Farrari said protestingly, "There has to be a first time for everyone. Who trained the first IPR agents?"

"They trained themselves, my boy, and a damnably touchy business it is for those making an initial contact. They photographed and recorded and observed endlessly, and stole garments and tools when they could get away with it, and they studied—intensive study such as you never dreamed of at your snug academy. Their lives depended on it. Usually it's a year, at least, before an IPR agent even allows a native to see him from a distance—if he can help it. And *you* want to take a few teloids! Look here. You want teloids of the *olz?* Just tell me how many thousand you need. We have them."

"Oh, I don't need that many."

"Just enough to give you a glimpse of life on Branoff IV? Here are some duplicates we've made up for the Bureau Archives. They're yours until the next supply contact."

"Thanks. They'll do nicely."

"I'll warn you, though. It isn't a pleasant life. You won't like it."

Farrari hurried back to his workroom, snapped the first tube of teloid cubes into the projector, threw the switch—and recoiled in horror.

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The three-dimensional projection filled the room in front of him. A slave woman lay on her back, her arms and legs threshing in a convulsion of agony, while a *durrl* calmly lashed at her with an unpruned branch. The whistle of the whip, the solid *whup* of its landing, the woman's screams of torment, the *durrl's* grunts blended in a terrifying melange of sounds. White-faced, wincing at every flick of the whip, Farrari was sickened into immobility. The blows struck with ruthless precision—now on the swollen abdomen, now on the already unrecognizable face, now on the churning limbs. Each downward stroke pealed away gruesome ribbons of flesh; each upswing flecked bright globules of blood into the cheerful sunlight.

The cube ran its five-minute course; at the very end the woman's body heaved in a final, wracking paroxysm of pain, and she gave birth.

Farrari waited helplessly for the next cube, but the projector was set to repeat. It clicked, and the abhorrent scene ran its course again. And again. Despite his numbing nausea, his overwhelming urge to turn away, to shut off the projector, to flee the room, he watched hypnotically and began to pick out small details. The woman had been working on the harvest. A pile of dirt-encrusted tubers stood near her battered head. One lay in the foreground, almost at Farrari's feet, its bulging diameter neatly incised with teeth marks. The emaciated arms and legs completed the story: the woman was starving; she had stolen a bite of food.

The cube was on its fourth repetition when Farrari abruptly became aware that the central characters in the violent drama were not alone. Two naked men, a woman wearing a loincloth, and a naked child watched with apparent indifference, as though they had seen it all before and it was anyway of no concern of theirs. Yet their eyes, flashing beneath low, protruding brows, transfixed Farrari. Where the faces were utterly devoid of emotion, the eyes were alive—with the tragic accumulation of generations of loathing and terror? He knew that he would never forget those dead faces and their pathetically alive, staring eyes.

Coordinator Paul's booming voice cut through the screams. "Fine way to spend an afternoon," he remarked.

He moved a pile of books from a chair and sat down, and Farrari

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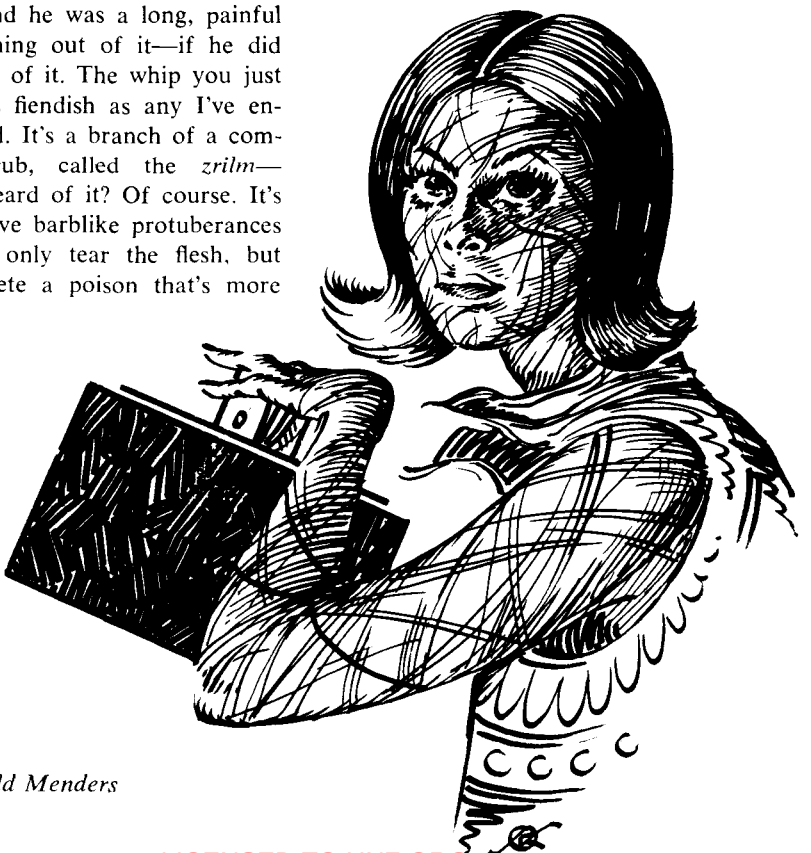
finally stirred himself and turned off the projector.

"The whip is a common denominator among slave worlds," the coordinator said, speaking as if the viewing of such horrors was a tiresome duty. "Sometimes it seems as if the ruling classes squander their creative energy on whips. They're always limited by the materials at hand, but they never overlook anything capable of inflicting torment. I remember an instance where the wool of a native animal had a toxic effect. One lash of a whip made of that wool would send a slave into shock, and he was a long, painful time coming out of it—if he did come out of it. The whip you just saw is as fiendish as any I've encountered. It's a branch of a common shrub, called the *zrilm*—you've heard of it? Of course. It's leaves have barblike protuberances that not only tear the flesh, but also secrete a poison that's more than mildly caustic. It's sheer torment merely to brush against a *zrilm* bush. A beating like the one you saw—well, you don't need a doctor to tell you that the woman didn't recover. Try the next cube and see what happened to the newborn baby."

"I'd rather not."

"The other *olz* got a Branoff IV dozen of lashes apiece—which is fifteen—just for being there. Including the child. She didn't recover, either. The whole affair was such a commonplace incident that



The World Menders

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if the *durrl* had to make out a daily report chances are he wouldn't have mentioned it. Life is cheap, there are more *olz* than can be fed anyway, and one or two less is a mark on the credit side of the ledger. How are you going to fit this into your cultural studies?"

Farrari shook his head. "Can't anything be done about it?"

"Not now. In a couple of thousand years—perhaps. The *olz* don't even seem to be aware of how badly off they are. Once they find out, it'll still be centuries before it occurs to them that something can be done about it. An invasion by the nomadic tribes might speed things up, but the few mountain passes are easily defended and the nomads have learned not to approach too closely. Whenever they do they're beaten soundly. And this is the only stable civilization, the only capable military power, on this planet."

"Couldn't we arrange for a *durrl* to drop dead whenever he starts to whip an *ol*?"

The coordinator winced. "Certainly not! You should see the report forms I have to fill out when we so much as accidentally cause the death, or injury, of a native!"

"Two thousand years," Farrari muttered. Forced labor, starvation, and torment."

"Do have a look at that next cube," Paul said, getting to his feet. "Have a look at all of them. And Farrari—"

Farrari looked up expectantly.

"Don't feel badly because we can't do anything about it. One of the first things an IPR man has to learn is that a drastic change requires extensive preparation. The greater the change, the more preparation is needed. And the more time."

He left, and Farrari returned the tube of teloid cubes to its box and meekly carried the box back to Ganoff Strunk. Then he fed his projector a tube of innocuous cultural cubes and began to dictate an analysis of the friezes on one of the *kru's* summer palaces.

He paused frequently, because each click of the projector made him wince, even though it did not remotely resemble the *whum* of a *zrkm* whip striking human flesh.

IV

Occasionally Liano Kurne could be found performing routine tasks in the records section. The morning after Farrari's shattering experience with the teloid cubes she was methodically snapping his dictation capsules into the transcriber, and each time she leaned over the machine her face and arms passed through its guide light. A complex network of scars flashed into view and just as abruptly disappeared.

Farrari caught his breath and involuntarily took a step backward. He thought instantly of the *durrl's* whistling scourge and the ribbons

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of flesh ripped from the helpless slave. Had Liano Kurne endured *that?*

Her husband had been killed; she had perhaps received a Branoff IV dozen of lashes just for being present. Now she worked patiently at simple tasks whenever she was able, withdrawn, strange in her moods, given to long periods of irrational, staring silence, and everyone was very kind to her.

Farrari shuddered.

Liano saw the movement and straightened up to regard him curiously. His mind was fumbling for a response to her unspoken question when Strunk's sudden entry diverted her attention.

"I have something for you," he said to Farrari.

He fed a teloid cube into a projector, and Farrari found himself gazing at the Life Temple of the *kru,* with the massive Tower-of-a-Thousand-Eyes rising above it. He had studied the building from every angle and knew its exterior better than that of any other edifice in this land of Scorvif. The temple's walls were so covered with relief carvings that it was virtually a picture book of art and history.

Now it stood transformed with a white drapery overhanging its entire facade, and on the drapery were painted an amazing complex of scenes: battles, hunts, ceremonials, all dominated by the larger-than-life figure of the *kru.*

Farrari took a second look and corrected himself sternly. Not painted—screened. "It's wonderful!" he breathed. "But—what is it?"

"Our people in Scorv think some kind of special ceremony is in the offing," Strunk said.

"But they don't really know?"

Strunk shook his head. "Probably our most acute problem here is that we know so little about the doings of the aristocracy."

"It's a pictorial biography!" Farrari exclaimed. "The execution is magnificent. You can actually see the *kru* getting older. Here's his celebrated victory over the outlanders."

Strunk snorted. "His army chased a few ragged nomads from the south pass. Outnumbered them thirty to one and the *kru* was at one of the summer palaces when it happened."

"It was the *kru's* victory, though. This scene must represent an unusually bountiful harvest. They credit the *kru* with that, too, but I suppose they blame the years of famine on the *olz.* Would you make me a copy of this?"

"I already have. Take it with you." Strunk reached for the projector's switch.

"Wait!" Farrari exclaimed. "Look at the last picture—the one in the bottom row!"

"What about it?"

"The sequence breaks off in mid-row, and the final scene doesn't have the *kru* in it!"

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"So it doesn't." Strunk shrugged. "So?"

Farrari leaped for the doorway. "Heber!" he shouted.

Continuing to shout, he ran toward Clough's workroom. By the time Clough heard him and came shuffling to meet him, it seemed that half the base staff had gathered in doorways to see what was the disturbance. Farrari ignored the questions called to him and urged Clough into a stumbling trot.

"What is it?" Clough panted, as the two of them hurried into the records section.

Farrari took a deep breath. "The *kru* is dead!"

"Dead?" Clough raised his hands bewilderedly. "How do you know?"

Farrari pointed. Clough stared uncomprehendingly for a moment, and then his head bobbed excitedly. "Of course. It's a common symbolism. The Vacant Throne, the Riderless Steed—in this case, the Missing God. The priests are at worship, but the God's living presence has been taken from them. Cedd, we can stop guessing about the succession. We'll soon *know!*"

The alarm buzzer emitted a thunderous rasp. At the same instant Strunk's voice boomed from the intercom. "Full staff—records section."

"What's up?" Farrari demanded.

"What's up?" Clough echoed, beaming at him. "The *kru* is dead. It'll be the first succession we've had an opportunity to observe. We've waited a long time for this—a *mighty* long time! Why, the study teams have been posted and briefed for years. This is quite a coup for you, young man. If you hadn't spotted that, we might have missed our chance."

Farrari turned to see a wave of the base's high brass charging through the door, Coordinator Paul in the lead. He muttered, "And I'd better be right."

A short time later he found himself sharing a dais with the teloid projection and lecturing about the drapery that he himself had first seen only twenty minutes before. His audience seemed skeptical despite Heber Clough's angry shouting about the Vacant Throne, the Riderless Steed and the Missing God, and peppered Farrari with questions. He kept his temper in check with difficulty. He was eager to begin his own analysis of the entire work, and instead he had to waste his time explaining the significance of what was, artistically, the least interesting picture of the group. Of all of the scenes, only the last had been produced with an absolute minimum of skill.

Then Jan Prochnow mounted the dais and peered searchingly into the projection. "I agree," he announced. "It's perfectly obvious. I can recall a number of similar instances. The *kru* will be conveyed to his eternal resting place behind

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whichever of the tower eyes he's selected, his subjects will eulogize the glorious events of his reign as depicted here, and then—this is only a guess, mind you—this drapery will be replaced with a blank one signifying the coming reign of the new *kru*, who will, of course, record his own glorious deeds."

"You have your assignments," Coordinator Paul said. "Let's go to work."

Farrari claimed his teloid cube and slipped out of a side exit before a converging wave of well-intentioned staff members could overwhelm him with congratulations. He returned to his workroom and eagerly snapped the cube into his own projector.

Unhesitatingly he pronounced the tapestry a masterpiece—if tapestry it was, he could think of no better word for it. The pictures had been screened onto the finished cloth, and their outlines were fuzzy where dyes had run together. They were obviously the work of many hands, and a careful appraisal convinced Farrari that the *kru's* long reign had outlasted at least three generations of artists.

The draftsmanship was excellent, the vivid colors breathtaking, the composition masterful. He puzzled long over the fact that the same culture that produced these exquisite, long-lasting dyes was so inept at paint making. The most recently retouched painting paled beside this tapestry.

He spent most of the day scrutinizing the scenes, and when finally he reached the bottom, dismissed the crudely-fashioned final scene with a shrug, and sat back exhausted to switch off the projector, he realized with a sudden twitch of conscience that once again he had forgotten the *people*. The essential ingredient of all of these brilliant pictures was the blood of the *olz*, who were nowhere represented. None of the three hundred and seventeen scenes portrayed a single *ol*.

He turned on the projector again, intending to dictate his impressions of the tapestry but his eyes kept wandering to the triangular-leafed *zrilm* shrubs, or to the branch of *zrilm* one official—a *durrl*—carried in a protective holster strapped to the flank of the *gril* he was riding, or to the tall hedges of *zrilm* that frequently appeared in the background. Were the artists satirically including the *olz* by proxy through the symbol of their subservience? He thought not. *Zrilm* was a common shrub, and the artists drew what they saw.

They drew what they saw, but they did not see the *olz*.

Farrari abandoned the projection. He paced his workroom briefly and then looked into the deserted corridor, realizing with a start that it had been hours since anyone had passed his doorway. Everyone else was furiously occupied. The *kru's* death was probably

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the most significant event that had occurred since IPR had arrived on Branoff IV, and the staff would ponder it and project it and perhaps even make it the basis of a future planning that might cut short those horrendous two thousand years. To Cultural Survey AT/1 Cedd Farrari, the only member of the staff without a special assignment, it meant only one more work of art to evaluate and classify.

He went to his sleeping room, sprawled on his couch, opened the IPR field manual. As he flipped past the capitalized truisms, his mind began to formulate arguments against them. REVOLUTION IS A CONCENTRATED EXCESS OF EVOLUTION? Not to Cedd Farrari. Evolution connotated a prolonged and inevitable natural process; revolution a violent surge of emotion. He suspected that too many of the Bureau's sacrosanct slogans were based more upon a contrived association of words than a distillation of ideas. FUNDAMENTAL TO ANY DEMOCRACY IS THE PEOPLE'S RIGHT TO BE WRONG? Perhaps no democracy had survived the abolishment of that principle, but neither could a democracy survive if its people erred consistently.

He was beginning to hate those blocks of leering capitals. What could this presumed wisdom mean to a people doomed to two thousand years of misery? Even that figure was only a Bureau estimate, a guess, and Farrari's private hunch was that far too many of the Bureau's guesses were proving overly optimistic. Otherwise its Supreme Headquarters would not have snatched so eagerly at the possibility of Cultural Survey miracles.

He slammed the manual to the floor and went for a walk. Many of the workrooms were empty, but the crowded conference rooms reverberated with talk and argument. Farrari strode past them scowling. He circled back toward his own rooms and saw Jan Prochnow still seated by the dais in the dining room. He had obtained another teloid of the tapestry, and he was staring into the projection, head tilted back, eyes narrowed, lips pursed in fierce concentration.

Farrari paused. "Is there any significance to the fact that this tapestry is covering the large relief of the *kru* above the main entrance?" he called.

Prochnow started, scowled resentfully at Farrari, and then turned to study the projection. "It may be the handiest place to hang the hinge," he said. "On the other hand, that relief is the one our agents call the 'moving picture' because it's changed periodically. Interesting question."

"The *kru's* most recent portrait is always on display there," Farrari persisted. "What's the chance that

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they took it down when the *kru* died, and the tapestry is covering the blank space until his successor is crowned?"

"Interesting thought," Prochnow mused. He scrambled to his feet. "I'll see what I can find out."

Farrari looked in on Heber Clough and found him poised intently over a genealogical chart. Farrari said accusingly, "Don't tell me you're *still* trying to guess the next *kru*!"

Clough regarded him irritably.

"Why don't you just relax and wait a day or two?" Farrari asked. "For that matter, why all the conferences? Why not just observe and then compare notes afterward?"

"A succession of power is the most critical operation in any government," Clough said. "Some manage the change easily, some *always* become embroiled in revolution or power struggle, and with others it's unpredictable. We have to plan our observations carefully, so as not to overlook anything, because it's often the best time to bring about a change of direction. In some societies it's the only time. Now go away and let me work. The *kru* had nineteen sons, but we don't know how many are still living, or who the survivors might be. It's a *pretty* problem."

Farrari departed disgustedly, had his dinner in his quarters, and went to bed. He was a long time falling asleep, but he awoke suddenly with a firm hand shaking him. Against the subdued ceiling glow he made out the shadowy figure of a man bent over him. Peter Jorrul's voice said, "I'm taking you to Scorv. How much time do you need to get your kit together?"

Farrari sat up and muttered sleepily, "What's that?"

"Get ready as quickly as you can. We're waiting for you—meet me at the hangar." He hurried away.

Farrari splashed water into his face and shook himself awake. He doubted that he'd heard Jorrul correctly, but he pulled on clothing and hurried to the hangar.

Workmen were packing supplies onto a large flying platform. Jorrul stood nearby, talking with Isa Graan. He wore native dress similar to what he'd worn on the night of Farrari's arrival, and he carried a heavy cloak over his arm.

He glanced at Farrari and scowled. "Where's your kit?"

"Kit?" Farrari echoed bewilderedly.

"Equipment. Tools. Whatever CS people work with."

Graan chuckled. "He carries all of it in his head. CS people don't work *with* things. They work *on* things."

Jorrul stalked away. Graan said, "You're the first specialist he's ever taken into the field who didn't insist on lugging half the base with him." He studied Farrari critically. "You'll need a cloak."

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"He didn't tell me how long I'll be gone. Should I take a change of clothing?"

Graan shook his head. "They'll give you a complete outfit when you arrive. Native dress, whatever they want you to wear. But, if you don't dress warmly on that platform, you'll freeze." He went to a supply room and returned with a padded cloak for Farrari. As an afterthought he tossed him a blanket.

Twenty minutes later Farrari was glad to have both. Graan had installed a weather shield, but even with that protection the high mountain valleys were bitterly cold. They soared between lofty, snow covered peaks, Jorrul handling the controls intently and Farrari huddling on a crate and pondering the power of this man. The night of Farrari's arrival he had restricted him to base. Permanently. Now, with a crook of his finger, he had transferred Farrari to the field team. The coordinator must have known and approved, but the procedure still seemed alarmingly informal if not irregular. Farrari didn't object to the informality, but he resented the fact that no one had bothered to tell him what it was he was expected to do.

Jorrul turned and raised his infravisor. "Know your Scorvif geography?"

"Vaguely," Farrari answered.

Jorrul lowered the visor with a snort of disgust. Chagrined, Farrari began to search his memory. The land of Scorvif lay amid its mountain surroundings like an elongated, six-fingered hand. At the high altitude of the fingertips the summers were cool, the winters snow-choked and frigid; but the elevation fell sharply, and through most of their lengths the broad finger valleys enjoyed mild summers and suffered cool, wet winters. The palm, being at the lowest level and nearest the equator, had mild winters and uncomfortably hot summers. Each finger funneled its streams into the land's one river that snaked across the palm, looping around the flat hill upon which stood Scorv, the land's only large city. In the spring the river was a thundering torrent that overflowed its banks and frequently gouged out a new course for itself. Sometimes it passed to the east of Scorv, sometimes to the west, and in especially wet springs the city stood on an island. At the land's southern boundaries the mountains closed in on the river, narrowing and deepening it and finally tumbling it through a series of impassable cascades into a granite-lined crevass.

That much Farrari knew, but as he squinted at the dim, snow-covered slopes he was humiliated to find that he had no idea where he was. The best route for a lumbering supply platform would not be the shortest, but the one that got the platform to its destination with the least possible chance of detec-

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tion. To reach the city of Scorv they would circle to the north and approach the *lilorr*, the palm-plain, by way of one of the mountain chains that separated the finger valleys. They would spend the day at a shelter and finally arrive at Scorv in the deepest darkness of the second night. A platform flight on a straight line from base to Scorv would arrive at dawn, and IPR could not risk startling an early-rising native with the sight of a strange object in the sky. If it left early enough to arrive in darkness, it would be aloft over the mountains before dark, and nomads sometimes hunted in the mountain valleys.

As Graan had once remarked, IPR proceeded cautiously in even its smallest endeavors.

As daylight touched the highest mountain peaks the platform dipped downward, slowed its pace, and nosed along a shallow valley. Farrari thought he could hear the tinkling murmur of a leaping mountain stream. At the end of the valley they drifted against the sheer face of a high cliff, and a cave opened soundlessly before them. The opening closed after them, and lights came on as the platform settled gently to the floor. Jorrul pulled off his visor and gestured wearily at the row of bunks along one wall.

"Better get some sleep," he said. "And enjoy it. Going into the field this is the last place, and returning it's the first place, where a field agent can sleep with both eyes closed."

He tossed a package of rations to Farrari and took one for himself, but before eating he went to the imposing bank of communications equipment in the corner. He first reported their safe arrival to base, and then he began to replay the reports that had accumulated. Munching his rations, Farrari reflected that this kind of officer simply did not occur in the Cultural Survey.

There was a disturbing grimness of purpose about him, as though he expected the worst of any situation and was usually right. His body was slender, his legs almost spindly, and his arms incongruously thick and muscular. It was probably small consolation to his subordinates that he would never order them to do something he would not do himself. There would be very few things that Peter Jorrul could not do himself.

Farrari had heard that he rarely smiled and never laughed.

When Farrari finally drifted off to sleep he had acquired a new respect for command responsibilities. Jorrul was still listening to reports, and his ration package was still unopened.

The cave was dark when Farrari awoke, and Jorrul was asleep. There was nothing for him to do but sleep again, which he did after lying awake for a time pondering

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the strange turn of events that had plucked him away from base. The next time he awoke there was a soft light in the corner where Jorrul was again poised over the communications equipment.

He looked up when Farrari swung down from his bunk. "Hungry?"

"Not especially," Farrari said.

"Have another ration package if you want it. But you might want to save your appetite—we'll be at my headquarters shortly after midnight, and there'll be a hot native meal waiting."

Farrari must have grimaced unconsciously, because Jorrul straightened up and demanded sternly, "Don't you like native food?"

Farrari said, "Well—"

"Have you ever had any?"

"Every week," Farrari said. "Dallum has those lunches, you know, and—"

He broke off in amazement as a legend exploded before his disbelieving eyes. Jorrul leaned forward in his chair to pound the floor with one hand while the other grasped his stomach and his body shook in a helpless convulsion of laughter. "Native food!" he gasped. "That's laboratory stuff. No sane native would touch any of it."

"I know that," Farrari admitted. "But when you said 'native food' that was the first thing I thought of."

Jorrul wiped his eyes, brushing aside his laughter with a final, resounding chuckle. "The *rascz* have a gourmet society," he said seriously. "That's why you rarely see my agents at base. They can't stand the food there."

"And the *olz*—do they have a gourmet society?"

"The *olz* starve, and so do my agents when they're living with them. But when they leave the field for a rest they don't go to base, they come to my headquarters where they can *eat*." He spoke to the transmitter. "Farrari's never had native food. Break him in gently. No, not the stuffed *forn*, but save some for me." He canceled out and sat back wearily, his eyes fixed on Farrari.

"How did you know the *kru* was dead?" he asked.

"I thought it was obvious," Farrari said.

"How'd you know the moving picture was missing?"

"I didn't. I still don't. It seemed like one good reason for the tapestry to be hanging there."

Jorrul got to his feet. "The worst thing about field work," he announced, "is the waiting."

After an hour Farrari agreed fervently. He returned to his bunk for the want of anything else to do and finally fell asleep again. When Jorrul shook him awake it was dark outside: when the platform cleared the last mountain and dipped down over the *lilorr*, it was midnight.

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Farrari, gazing up at the brilliant span of starlight, asked suddenly, "Aren't there any moons?"

After a long pause Jorrul answered curtly, "No. No moons."

Under the bright sky the land below seemed appallingly black, a vast emptiness broken only once by the distant, half-concealed red glow of a dying fire.

Finally the platform settled slowly and came to rest. Invisible hands assisted Farrari as he climbed out. Jorrul followed him, announcing with rare enthusiasm, "Field team headquarters. Now we can eat."

V

The faint, persistent vibration could have been Farrari's imagination, but the incessant rumble in the background was real. Jorrul ate his stuffed *forn* slowly, with obvious relish, and listened to reports. Farrari ate a rich stew much more slowly—he didn't like it—and tried to follow the conversation.

Agent 93 reported a squad of the *kru's* cavalry headed up the *narru*, one of the finger valleys, and this fact was discussed and pondered with a seriousness that Farrari would have accorded only to a full army on the march.

Agent 176 reported a village of sick *olz* on the south edge of the *lilorr*. Jorrul sat up alertly, pushed his food aside, and wanted to know what action had been taken. When informed that the report had just been received, he hurried away to talk with base.

Enis Holt, their portly host, who had introduced himself to Farrari as 101 and added his name as an afterthought, met Farrari's puzzlement with a smile. "The *olz* are in such poor health that even a mild epidemic could decimate the population," he explained.

"The *olz* would be better off dead," Farrari said firmly.

Holt's smile broadened. "Is that the Cultural Survey point-of-view?"

"The humanitarian point-of-view."

"No." Holt shook his head emphatically. "The humanitarian would improve their lives, not end them. That's also the IPR viewpoint. IPR has to consider the welfare of a civilization, too, as opposed to that of any of its components. This is the only stable civilization on the planet, and, therefore, it's our only hope for the long-term improvement of the lives of the planet's people. And this civilization couldn't survive without the *olz*."

"Are the *rascz* aware of that?" Farrari asked politely.

"No. One of our critical problems is to find a way to make them aware of it before they inadvertently extermine the *olz*."

Jorrul returned, skewered another slice of the *forn*, and munched thoughtfully. "Next," he said.

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Holt consulted his notes. "The water level at the *demc* is a meter below normal. If we don't get some rain soon, there'll be dry wells all over the *lilorr* and a lot of thirsty *olz*. Agent 213 reports nine new *durrlz* assigned to the *hilngol*, which we more or less expected after last year's production drop. And Agent 148 fell off his *gril* and sprained an ankle, the clod. Fortunately no one saw him. Then 124 . . ."

Holt's wife Rani, who had served their food, was hovering about the table watchfully. Farrari touched her arm and whispered, "What's the noise?"

"Noise?" she repeated blankly. "Noise? Oh, you mean—" She chuckled. "I haven't heard it for years. It's with us all the time, you see. This is a mill. Would you like to see it?"

Farrari nodded. He followed her from the room. Jorrul, intent on the implications of 124's report, took no notice of them. They descended one of the strange *Rasczian* stairways—the *rascz* were blessed with natural cement of an excellent quality but evidently had never thought to mold it into steps; their stairs were ramps with carefully-selected stones set at random. Farrari considered the stones more of a nuisance than an assistance.

The stairs ended at a balcony overlooking the mill's cavernous interior. A single light flickered below, a burning chunk of wood floated in a stone trough filled with *quarm* oil. Across the huge room were two rows of double grinding stones, the upper circular with a single protruding beam. Only three were in operation; *narmpfz*, ugly, placid creatures with enormous, powerful bodies, very little neck, and large, toothless mouths surrounded by superficial heads, plodded in patient circles straining against the beams. The stones turned on a central hub with an incessant, rasping racket.

They descended a longer stairway to the ground level. As Farrari was examining a pair of idle grindstones two young men wearing stripped apprentice aprons entered through a door at the end of the room. They nodded at Rani Holt and eyed Farrari curiously as they passed. They halted one of the *narmpfz* with a slap on its flank, set a wedge, and raised the upper stone with blows of a huge mallet. After they swept the coarse flour onto a cloth they scooped measures of grain from a large crock and scattered them between the stones. The *narmpf* waited patiently until another slap on its flank set it in motion again. They repeated the operation at the other stones, poured their meager accumulation of flour into a crock, and made their exit.

Rani Holt spoke into Farrari's ear. "It would be so easy to introduce technological improvements. But, of course, we can't."

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"Technology imposed from without," Farrari muttered. He shouted back at her, "It must require a lot of mills to feed the population."

They turned down a final stairway that led to a narrow, subterranean chamber where long rows of crocks stood. She pressed against the rough stone wall; it swung inward, and they stepped through into a smaller storage room. The wall swung shut after them, reducing the noises of the mill to a dull vibration. On the far side she opened another concealed door and led him into a large, brilliantly-lighted underground room. In one corner a communications technician manned his instruments; in another a machinist shaped a piece of metal. A man and a woman were drinking from tall mugs in a small lounge near the entrance.

"Field team headquarters," Rani explained. "Supply base, workshops, communications center. What was it you asked me upstairs?"

"I said it must take a lot of mills to feed the population."

She nodded. "We could do it by oursleves, you know. We have a power mill here, and we do most of our grinding on it. We have to have the output expected of a mill of this size, and if we did all the grinding with those primitive grindstones it would require more manpower than we can spare. Because, you understand, everyone connected with this place has to be IPR. We operate continuously, but only enough stones to make it sound as if we're furiously busy."

"Power mill?" Farrari repeated. "But I thought—"

"We aren't giving it to the *rascz*," she explained. "We're just using it ourselves. It required quite a lot of adjustment to make it produce flour as coarsely ground as that of the mill. We're very well situated here. Millers are among the most substantial citizens, and this is one of the most important mills in Scorvif. Enis is highly thought of. Even the court dignitaries stop to exchange mugs with him when they pass this way. A mill is a center for all kinds of traffic, which lets our agents come and go freely. We can send our supposed journeymen anywhere buying grain, or delivering flour, or prospecting for a new millstone. The noise of the mill is very useful when the workshop is operating. Yes, we're very well situated."

"How does an IPR agent get to be a substantial citizen like a miller?" Farrari asked.

She smiled. "With patience. And unlimited time. And even then it required luck. It took two generations of agents working as apprentices and journeymen before a miller died childless and we were able to purchase his mill."

She led him to the clothing bins and picked out a worn, short-sleeved shirt, ragged trousers of

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coarse cloth, mud-spattered boots with wood soles and high cloth tops, and a skull cap. "We'll start you out as an apprentice's helper," she said. "That door leads to the sleeping room. Sleep as long as you like, and put these on when you wake up. Someone will show you what an apprentice's helper does, just in case visitors catch you upstairs, or outside, and you have to look busy. Can you speak *Rasczian*?"

"Only a little," he admitted.

"Don't try to speak it to a native. This country doesn't have foreigners, and a person who can't speak *Rasczian* flawlessly is unheard of. We should do something about your hair, no *rasc* has long curly hair, but perhaps you can get by if you wear the cap. Anything else you'd like to know?"

"Yes," Farrari said. "Why was I brought here?"

"Day before yesterday," she said seriously, "base informed us that the *kru* was dead. We don't often receive information from base. We are the ones who tell base what is happening in Scorvif. None of our agents had an inkling that the *kru* was in anything but the best of health, but, if base thought otherwise, we had to investigate. So we did, with considerable trouble and risk, and we learned that the *kru* was dead. That startled all of us. In the meantime Peter had returned to base to take care of accumulated business and pick up supplies, and he passed the word that the moving picture had been removed from the Life Temple. So we floated a platform up to the temple—this planet having no moon is sometimes very useful—and had a peek behind that precious drapery, and sure enough, the moving picture *had* been removed. Naturally Peter—all of us—wanted to know how base was finding out these things, and when it turned out that the Cultural Survey trainee was responsible, Peter decided to bring him here to find out what else he could do." She smiled. "So that's why you're here. Better get some sleep. You'll have an audience tomorrow—every agent who can get away is likely to want to see a Cultural Survey trainee in action."

Farrari found himself in action as soon as he awoke, and he enjoyed none of it. He cleaned out a *narmpf* stall, learning to handle a heavy, wood-bladed shovel while not breathing through his nose. He helped to unload a grain wagon and then to load a flour wagon, mastering after a fashion the technique of balancing the heavy crocks on edge and maneuvering them. The young IPR agents performed such heavy manual labor stoically. Natives did it; they were natives, so they did it. Farrari's muttered complaints first amused and then annoyed them. They sternly ordered him to mutter in silence until he'd learned to complain

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in *Rasczian*, and as punishment they left him to line up the grain crocks by himself. He managed to do it, upsetting only three of them in the process. Fortunately the seals held and there was no audience.

Rani Holt finally rescued him, leading him off to a meal of regulation IPR rations. He thanked her sincerely; she smiled and remarked that the native food took some getting used to, and those who had been eating it for years tended to forget that. Since Farrari had developed no compelling fondness for manipulating grain crocks, he ate slowly and relaxed his aching muscles. Not until he had finished did she inform him that he'd been ordered to attend a staff meeting that had already started.

He attempted to slip into the room unobserved, but conversation halted when he appeared. Enis Holt motioned him to the table, Jorrul indicated a vacant chair, and the four strange faces regarded him with frank curiosity.

Jorrul performed introductions: Anan Borgley, 112, baker in Scorv. Ned Lindor, 89, grainery supervisor. Bion Brilett, 130, stonecutter. Karl Mdan, 193, potter. Farrari acknowledged the introductions gravely, feeling increasingly impressed and puzzled. These men, in the work dress of their occupations, could visit a miller as often as they chose without causing comment. The baker could be buying flour; the grainery supervisor selling grain; the stonecutter shaping new millstones; the potter delivering grain crocks. IPR had achieved a fiendish efficiency on this planet. Why, then, did it accomplish so little?

"We have a mystery on our hands," Jorrul said. "The *kru* is dead but there has been no public announcement except for the drapery on the Life Temple and no explanation of that. And there seems to be no public reaction. We were wondering if perhaps it's been so long since a *kru* died that neither the officials nor the citizens quite know what's to be done, or how they should act."

"The *kru* was considered a god," Farrari said. "Surely there'd be a religious tradition concerning his death, and for anything that important there'd be a voluminous written record. What does Jan Prochnow have to say about it?"

The six pairs of eyes remained fixed on Farrari. Jorrul said lightly, "We'd like to know what Cultural Survey has to say about it."

Farrari experienced neither anger nor resentment. They had a new toy to play with, a Cultural Survey toy, and whether he joined in their game or not, the result had been predetermined by them. Two thousand years.

"Do the citizens know the meaning of the tapestry?" he asked.

"A guard was posted at the entrance to the temple square before the drapery was hung," Borgley an-

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swered. "The square has been closed off ever since, at considerable inconvenience to the population—the city's main thoroughfare passes through it. So they *must* know that something has happened or is about to happen, but no one talks about it."

"*You* knew the *kru* was dead as soon as you saw the tapestry," Jorrul said. "The citizens of Scorvif ought to be as perceptive as a Cultural Survey trainee concerning their own *kru*, but there's been no reaction. Why?"

"Has any kind of tapestry or cloth been hung there before?" Farrari asked.

Borgley shook his head.

"I knew the *kru* was dead because the final picture said so. Is it possible to make out the details of the tapestry from outside the square?"

"No. It's an extremely large square. The details wouldn't be visible without binoculars, and the *rascz* don't have any."

"If a tapestry is hung only when the *kru* dies, the citizens wouldn't have to see the details to get the message. Do you have a teloid of it?"

Jorrul wheeled in a projector and snapped the cube into it. Farrari studied the projection meditatively. "In my report I noted that the final scene—the one without the *kru*—was crudely done. I was wrong. It was *hastily* done." The six pairs of eyes were now frowning into the projection. "A religious tradition," Farrari went on. "The *kru* is dead. The *kru's* portrait is on the facade of the Life Temple. The portrait of a dead *kru* on the Life Temple is sacrilege. So, in a frenzy of haste, slap the final scene onto the tapestry so it can be hung over the facade and the portrait removed."

"Interesting," Jorrul remarked politely. "But why no public announcement?"

"You're asking the wrong question," Farrari said. "Either the mere hanging of the tapestry is announcement enough, or it's considered none of the public's business. The question is—what are they waiting for? The *kru* is dead. If they were giving him a state funeral, they would have announced his death and at least started preparations. They haven't, so they probably won't. So why don't they invest, or crown, or elevate, or whatever it is they do to the new *kru*, and carry on?" He thought for a moment. "Prochnow has the idea that the dead *kru* selects the eye through which he will watch over his subjects for all eternity, and when he dies he's buried behind it. If true, the *kru's* death means only that he'll be watching over his people from a different residence. The really significant thing would be the elevating of the new *kru*. And the new *kru*—" He paused. "Of course. They can't crown the new *kru* until *his* por-

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trait is on the Life Temple. The Life Temple of the *kru* without a portrait of a live *kru* to adorn it is likewise sacrilege. Right now the new *kru* should be sitting for his portrait, and because it's a portrait of the *kru*, they won't dare to do it hastily."

The others exchanged solemn glances that suddenly twisted into grins. Jorrul said, "One of our agents—that's 178—is a *krolc*, a priest's lay servant, which is the closest we've ever been able to place anyone to the priesthood. His master was ordered to Scorv for the ceremonies of enshrinement and coronation—canonization might be a better word, the new *kru* is invested as a god. Anyway, 178 got to come along. It's the first time we've had an agent inside the Life Temple—legally, that is."

"Will he be able to take some teloids?" Farrari asked.

"How's that?"

"Teloids. Of the interior of the Life Temple. I don't have interiors of a single temple or palace."

Jorrul said irritably, "Of course. He's already taken some. Anyway, he reports that every prominent artist in Scorvif is at work on reliefs of the new *kru*. When one of them comes up with something the *kru* likes—or maybe something the priests like—the ceremonies can commence. They'll take down the old *kru's* tapestry, hang a blank one, perform the necessary incantations, and when they remove that the new *kru's* portrait will be in place. The Holy Ancestors will have spoken. Prochnow thinks they'll make a production of it and drag the ceremony out for days."

"When can I have them?" Farrari asked.

"Have what?"

"The teloids of the temple's interior?"

Jorrul shrugged. "When they're processed, I suppose."

Farrari wrenched his mind back to the business at hand. His anger, when it finally came, was not less fierce because he'd been slow to react. They had set a trap for him, and the fact that he'd made a lucky hit did not distract him from the realization that he could just as easily have made a fool of himself. Testing, he thought, looking about the table with cold contempt, was a game two could play. They'd had their fun with their Cultural Survey toy; he was entitled to a share of amusement in return. He would hand them a problem that no IPR manual could cope with and watch them squirm.

"That's very interesting," he mused. "The ceremony, I mean. Is the intent to give the impression that the Holy Ancestors selected the *kru's* successor? What I mean is this: Is the mechanics of this known to everyone and, therefore, just a formality, or will the identity of the new *kru* be revealed

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only when the portrait is unveiled?"

"*We* know the identity now," Jorrul said. "The new *kru* is at the temple sitting for his portrait, as you put it. It's one of the old *kru's* younger sons—the fourteenth, I believe. There's a fracas at base over the question of how he was selected. Prochnow thinks he was the *kru's* favorite and, therefore, his heir; Heber Clough thinks he was the favorite *because* he was the heir and some obscure formula of succession is involved. We in the field weren't aware that the *kru* had a favorite—son or anything else. I haven't answered your question, have I?"

"No," Farrari said. "I was wondering if the priests make the selection and use this ceremonial fa-de-la to announce their decision."

"I don't know. It may take us centuries to unravel all the details about the succession."

"But do the *kru's* subjects believe?" Farrari persisted. "Do they really think the Holy Ancestors place the portrait of the new *kru* behind the tapestry, or is it a convention that they profess to accept while cynically ignoring the bulges made by the priests working there?"

"We don't know," Anan Borgley said. "This is the first succession we've observed, and thus far the average citizen—we work at being absolutely average—seems to know nothing about it, so we know nothing about it."

"Do you have a teloid of the old *kru's* relief?"

Jorrul thought he did, rummaged through an unsorted box of cubes, decided he didn't, and finally found one. The others waited indifferently as he snapped it into the projector and the old *kru's* wrinkled face formed in front of them. Farrari studied it intently, slowly shaking his head.

"I wish it were a painting," he said finally. "A painting I think I could manage, but I never was worth a damn at sculpture."

Jorrul sat down heavily. "What's that about painting?"

"I was thinking what a lovely joke it would be if they dropped the tapestry and found someone else's portrait there. An older son, or a nephew, or even a total stranger. What would happen?"

"That's an interesting question, but, of course, we couldn't interfere."

"Why not? DEMOCRACY IMPOSED FROM WITHOUT doesn't say a thing about switching portraits."

"Other rules do. We can't tamper with a religious ceremony."

"We wouldn't. We'd just alter one of the props."

"Even if there's no rule against it," Jorrul said, "and there almost certainly is, and even if the coordinator were to approve it, and he almost certainly wouldn't, the preparations would require more time than we'd have. The artists work-

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ing on the new *kru's* portrait have a long start on you, and anyway, if you're no good at sculpture—" He dismisssd the subject with a shrug.

Farrari ignored him. His eyes were fixed admiringly on the image of the old *kru*. "That's the trouble with great art," he observed in the confident tones of a lecturer at the CS Academy. "The more realistic it is, the more it goes beyond realism. We couldn't begin to match the expressiveness this sculptor achieved. He's represented a cruel, self-centered old man and made him seem like a god. The dissipation in his face takes on a hallowed aspect. I wonder if the artist really believed in what he was doing, or if he was just more skilled than any artist has a right to be. We couldn't match this expressiveness, but absolute realism may be an adequate substitute. Care to nominate anyone for *kru*?"

Jorrul left the room and returned with an armload of manuals. He began leafing through them, checking reference after reference. When finally he pushsd them aside he seemed amused and at the same time perplexed.

"There isn't anything in the regulations to cover it," he admitted.

"I didn't see how there could be," Farrari said.

"The instructions about tampering with a religion are explicit enough: don't. Whether or not what you're proposing could really be called tampering is moot, but if your substitute portrait approximated the style of art they're accustomed to, we could consider the switch a mere act of politics. I have five volumes about tampering with technology—they can be summarized with the same word, don't—but this notion of yours doesn't technically concern either religion or technology."

"Of course not," Farrari said. "It concerns technography."

Jorrul turned again to his manuals and after a few minutes announced, "I can't find a reference to that. How long would it take you to make a portrait?"

"A couple of hours."

Jorrul gaped at him.

"I won't have to do it by hand," Farrari explained. "I'll find a teloid of the candidate we want and have it enlarged into a three-dimensional fix and a relief casting made in plastic metal."

"Plastic—"

"It should be possible to mix a plastic that the natives couldn't tell from their black marble without handling it. They won't be handling it. We'll rig the thing with its own power supply so it'll administer a stiff electric shock to anyone who touches it." He grinned around a circle of blank faces. "There wouldn't be any point in going to all this trouble if as soon as the priests notice the switch they can raise the tapestry and do a

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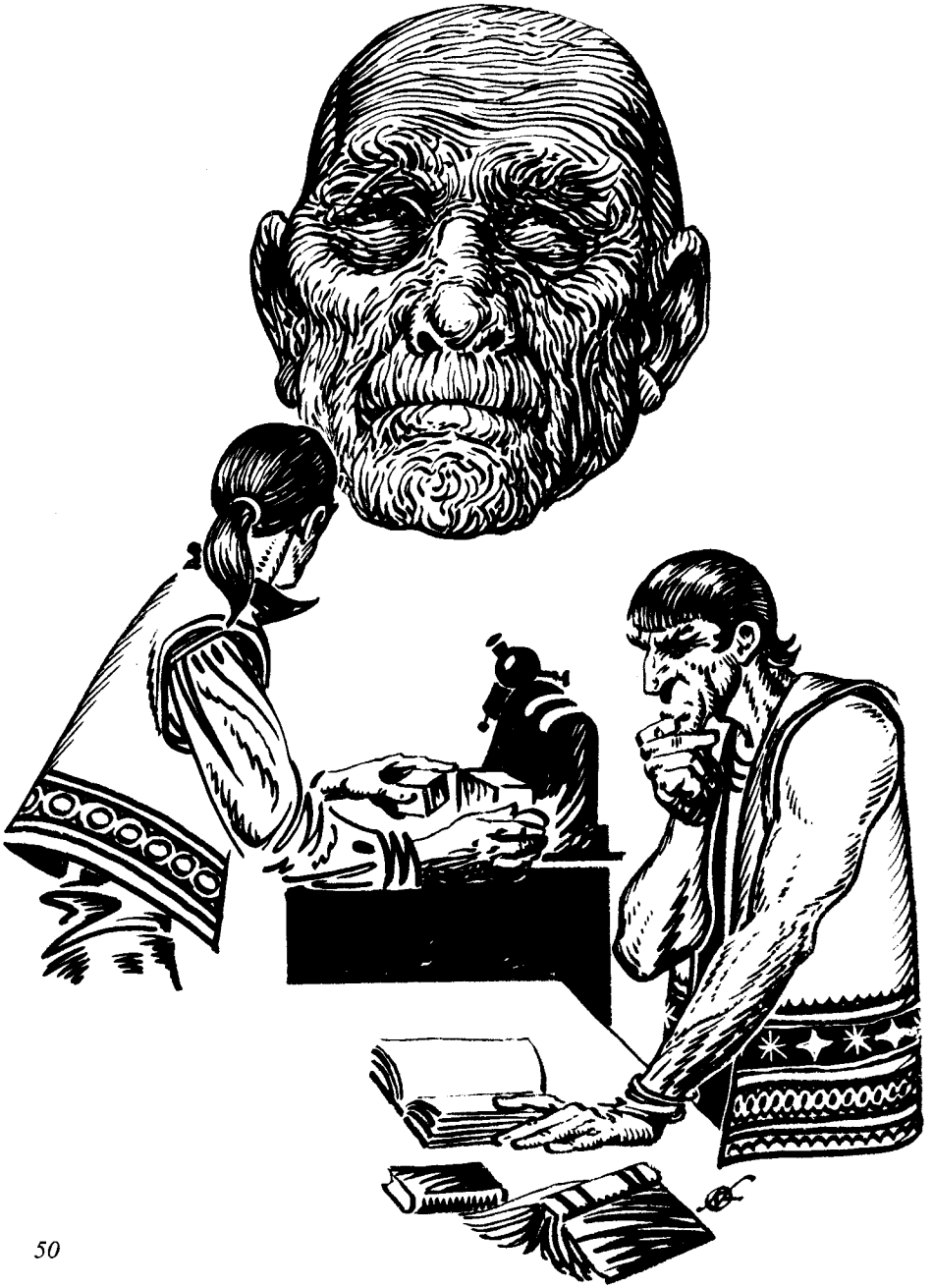

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switch of their own. If the Holy Ancestors are going to speak through us, we have a solemn obligation to leave the impression that they mean what they say. I'm sure Graan could make the casting at base. Your men might even be able to do it here."

Jorrul shook his head. "That *would* be tampering."

"No, sir. *Reinforcing.* If there are any nonbelievers among the priests, they'll be converted the instant they touch our portrait."

Jorrul obviously was not convinced, but he asked, "Whose portrait would you use?"

"We can ask Heber Clough for suggestions. The royal family is his department."

Ned Lindor, the grainery supervisor, said dryly, "Clough isn't the only person familiar with the royal family. Where did you think he was getting his information? But there isn't much choice, one member is as bad as the next. If there was an outstanding candidate, I'd say—don't use him. We wouldn't want to lose a man who might have some long-term value to us, and anyone we'd choose would have an excellent chance of being murdered."

"*Murdered?*" Farrari exclaimed.

"Murdered. When you tamper with the succession to a throne, you aren't playing a child's game. But as I said, one is as bad as the next."

"Then we can concentrate on physiognomy," Farrari said. "It should be someone who'll be instantly recognized and who looks nothing like the legitimate heir."

"There's a relative of the old *kru*," Borgley said. "We're not sure how he's related—maybe a cousin, maybe a younger brother. His long nose has been something of a joke all his life. He's an old man himself, and he's contributed more than his fair share of evil to this world. No one would mistake *his* profile, and if he comes to a bad end at this late date we needn't lose any sleep over it."

"Good idea," Jorrul said. "It'd be a pleasure to see old Hook Nose get his."

"You mean—we can do it?" Farrari asked incredulously.

"Certainly not. It's an ingenious idea, and one that might be tremendously effective—at the proper time. For example, if there was a revolutionary movement flourishing, something like this could give it enough impetus to make it a success. Using it now wouldn't accomplish a thing—old Hook Nose isn't capable of leading a revolution and it wouldn't change the situation in Scorvif if he did—and we'd destroy the idea's effectiveness for later use. I wouldn't consider using it now. It's too good an idea to waste."

VI

Farrari stood behind a high parapet on the mill's flat roof and

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for the first time in daylight looked directly at the land of Scorvif. Scorv was a smudge on the horizon, the Tower-of-a-Thousand-Eyes a dark line perpendicular to it. He activated the viewer and brought the city leaping toward him. The smudge resolved itself into a vast clutter of buildings that crowded an enormous, truncated hill and on one side spread thinly about its base. The tower, with its carved myriads of all-seeing eyes perpetually on guard, fascinated him. Through a chance gap in the city's mass of buildings he could even make out a corner of the old *kru's* tapestry.

He recognized many of the buildings, but he had known them only as solitary structures lifted from their surroundings by the magic of the teloid cube. As a group they looked strange to him, and he puzzled for a time over the spectacle of two sharply contrasting, almost conflicting, architectural styles encroaching upon each other.

He rotated the viewer slowly. The mill was also situated on high ground near the river, and he wondered if at one time the city as well as the ponderous old stone mill had been forts. Between mill and city, and beyond, the country was a vast sweep of wasteland, scarred and eroded, with here and there a few scraggly *zrilm* bushes standing in line like ancient, enfeebled sentinels. To the north, the horizon was lushly yellow and scarlet, and the viewer resolved it into irregularly-shaped fields marked off by the dark, velvety blue of towering *zrilm* hedges. The wasteland had once been like that, but the corrosive touch of the blundering *rascz* had exhausted it, and then the elements had devastated it, and now even the hearty *zrilm* could not survive there.

He took another, sweeping look at the devastated wasteland. Much of the country's most fertile land had been ruined before the *rascz* grasped the simplest principles of soil management, and they still had no concept of the rudiments of plant genetics.

The distant, fertile land beyond seemed cool and restful. He rotated the viewer quickly and then with an exclamation brought it to an abrupt stop and back-tracked. At the end of a *zrilm*-lined lane stood a village. Low huts of woven branches plastered with clay stood in a narrow oval, their rough green surfaces glazed by the sun and here and there reflecting light from jewel-like facets. At the center of the oval was the fire pit, and, nearby, a small pile of *quarm* logs.

A deserted *ol* village, tragic reminder that the *rascz* devastated not only land, but people; reminder of the coming two thousand years of starvation and the whistle and thud of the *zrilm* whip with no potential leader in the land possessing a dram of humanitarian instinct.

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Again he had forgotten the *olz*.

So intent was he on the crude village that he did not notice Anan Borgley until the baker spoke to him. "Not much culture to study there," Borgley observed dryly.

"What happened to them?" Farrari demanded.

"What happened to whom?"

"The *olz*."

Borgley shrugged. "Nothing happened to them. They're at work in the fields. You can't see them because of the hedges. Looks like a good crop this year, which is fortunate. It's the year of the half crop."

"What about the children and the elders? Do all of them work?"

"All of them," Borgley said. "A baby old enough to toddle is old enough to pull weeds. The younger ones are carried by their mothers—who, of course, put in the full day's work. As for the elders—there aren't any. No *ol* lives long enough to become an elder."

Farrari looked again at the huts. "What do they do during the winter?"

"They stay in their village," Borgley said. "And rot. I'm taking you to Scorv. They tell me you did not do well as a mill apprentice's helper." He chuckled. "Maybe you'll like the bakery business better—though I'll warn you that you'll work harder."

Farrari gave the viewer a final spin. "Why do they have a mill out here in the middle of nowhere?"

"It's a very old building," Borgley said. "When it was built it probably stood in the center of a fertile grain-growing area, and they thought flour easier to transport than grain. That's one theory. Another is that the mills make a lot of noise when running to capacity, and some ancient *kru* banished them from Scorv so he could sleep nights. The specialists at base probably have a dozen more theories, and we'll never be sure as to which is correct, if any, the fact is that most of the mills in the *lilorr* are about the same distance from Scorv as this one, in various directions, and all of them are in the middle of nowhere."

"If your theory is correct, why didn't they move the mills when the grainfields wore out?"

"This whole country is wearing out," Borgley said brusquely. "Sometimes it worries me. Ready to go?"

The country was wearing out. The road was excellent—wide, solidly constructed of broad, flat stones, sloped and ditched for drainage, but it appeared to be centuries old. The passage of countless wagons had rutted the stone, and that puzzled Farrari because the ruts were much narrower than the wide wheels of the wagons. The puzzle resolved itself when they reached the first washout. There the road dipped into a deeply eroded gully. Dirt had been dumped into it and leveled, but it

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was crisscrossed with soft ruts and the road made a steep plunge on either side. Rather than properly repair the road, the *rascz* had widened their wagon wheels so that the loads wouldn't sink so deeply into the soft dirt and transferred the problem to the powerful muscles of the *narmpfz*. The *narmpfz* strained and whimpered and tensed their massive bodies and somehow kept the wagons moving.

Twice troops of the *kru's* cavalry passed them, headed for Scorv. Short, colorful capes flapping, bundles of spears strapped to their saddles, they pranced along single file on their *grils*, graceful, high-stepping horned steeds. Traffic in the opposite direction was not heavy, but it was continuous: wagons headed for the mill or perhaps for a remote grainery, a *kru's* messenger keeping his *gril* at a desperate, lunging run with high-pitched shouts and veering recklessly around the slower traffic, occasional solitary riders lumbering along on *narmpfz*—wagoneers, Borgley said, who lived in one of the up-country towns and made their living by building wagons und selling them in Scorv with a load of *quarm* wood.

The river looped toward them, and as they reached its floodplain they began to encounter tremendous washouts. When possible the road bypassed them, but though the detours now ran over hard ground, in wet weather the heavy wagons would churn them into morasses.

The country was wearing out.

In the full heat of midafternoon they approached the city of Scorv. The road merged with another coming in from the west, then with one from the south that within sight of the intersection merged with another from the southwest, then with one from the east that led downstream to a ford that only *grilz* could negotiate; wagons had to journey far north of the mill to find even a low-water crossing.

Farrari muttered, "Why don't you invent a bridge and get rich?" Borgley did not answer. Technology imposed from without . . .

The road pointed upward, encircling the hill to reach the city that crowded its broad summit. They turned aside when they reached the cluster of buildings at the foot of the hill, entered a stone-walled enclosure, and came to a stop amid rows of stacked *quarm* wood and empty flour crocks behind a double-storied, stone building from which emanated the rich, tantalizing odors of baked bread and pastry.

"Home," Borgley announced, using the *Rasczian* word.

Two apprentices, both young IPR agents, hurried out to unload the wagon. Farrari offered to help and did not feel offended when they laughingly waved him aside. Borgley led him into the bakery, a

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long room with a row of stone ovens at one side and huge vats already bulging with rising dough for the night's baking, and up one of the ramplike stairways to his living quarters. He introduced his wife Nissa, 228, and a few moments later Farrari sat relaxed in front of an open slit in the wall that constituted a *Rasczian* window and looked down on the master race of Scorvif while sipping a cool, pungent drink and munching a hard, chewy, excessively sweet cake.

He stared disbelievingly: he had come to think of them as monsters, these *rascz*, and they were obviously a happy albeit serious people, decent looking, decent behaving, with high regard for family, for work, for an orderly society, humbly worshipful before their *kru*.

As cooling shadows of late afternoon enveloped the narrow street, the merchants and craftsmen emerged with their families, the women wound in strips of exquisitely-colored cloth—from those same vivid, long-lasting dyes Farrari had admired on the *kru's* tapestry—the men bare-armed with embroidered vests and the short, legless garment Peter Jorrul had worn, the children charming miniature replicas of their parents. They greeted friends with a polite but obviously affectionate formality. Some began the long climb to the city to greet friends there, and a short time later a few city families arrived to greet friends in this foot-of-the-hill suburb.

They were not monsters.

"Where are the *olz*?" Farrari demanded suddenly.

Nissa Borgley smiled. She was younger than Rani Holt, slender, quietly attractive, and with a subdued personality that puzzled Farrari until he remembered that these agents, in their adopted environment, actually were natives. Rani Holt, wife of a miller, was a hostess: because of its remoteness the mill also served as an inn, with an endless procession of overnight guests to entertain. She played her role to perfection. Nissa Borgley was the wife of a city tradesman: she would walk with her husband, of an afternoon, and greet friends quietly but affectionately, and in her own home she would be the typical *Rasczian* housewife and speak when spoken to. She, also, played her role to perfection.

"I've never seen an *ol*," she said. "There aren't any in Scorv—or in any other city or town. You see—the *olz* belong to the *kru*."

Farrari repeated slowly, "The *olz* belong to the—"

"So does the land. All of the agriculture and forestry and animal husbandry and mining are royal monopolies. So there are no taxes—the *kru* derives his income from his own properties."

"No wonder the *rascz* look like a happy people!"

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"Actually, there is one tax," she went on. "A child tax. There's an annual tax on each child after the second, and it rises steeply. The realm of Scorvif is circumscribed by mountains, and there is no place for a surplus population. In the remote past some astute *kru*, or minister, discerned that if the population ever increased beyond the capacity of the land to support it, the *rascz* would be in deep trouble. Hence the tax. It's possible to have more than two children without penalty if someone who has less than two will, in effect, sponsor them. It's an oblique form of adoption. Anan and I have two sons. They are legally ours, but they live with their natural parents who are, of course, our grateful friends. It's very useful for IPR agents to have natives who are grateful friends. The tax keeps the population stable. Otherwise, the *kru's* revenues come from the royal monopolies, and he is immensely wealthy."

"No private citizen owns an *ol*?"

She shook her head. "Nor any nobleman. Like agriculture and forestry and the rest, the *olz* are a royal monopoly. Except for those citizens who work in the *kru's* service, and those few whose work requires them to travel, I doubt if very many of the *rascz* see even one *ol* in an entire lifetime. I've lived here for ten years—ten Branoff IV years—and I've never seen an *ol* except in teloids."

"I didn't know anything about that," Farrari said. "I've been studying the wrong things. All this time I've been thinking that everyone forgets the *olz*, and the fact is that no one knows that they exist."

Borgley came in. His wife looked at his face and suddenly burst into laughter. "You have to go back," she said.

Borgley nodded. "You, too. And Haral. Peter is calling in everyone who can get away. The coordinator is coming out with a couple of loads of specialists." He gestured wearily and said to Farrari, "They'll spend a day and a night telling us everything they want to find out about the old *kru's* funeral and the coronation of the new *kru*. And then we'll come back and carry on just as we have been, which is the only thing we can do. I'm a baker. I can't play spy until the next day's bread and cake is out of the oven and ready to sell. Every day. Otherwise I'm not acting like a baker, and the moment I stop acting like a baker I'd better get out of Scorv—fast." He hurried away.

Nissa Borgley got to her feet to follow him. "We'll leave as soon as it's dark," she said. "Gayne will be in charge until we get back. If you want anything, ask him, or Inez."

She left, and Farrari turned his attention to the window.

The *rascz*. They were a happy, prosperous people, and few of

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them were aware that their happiness and prosperity were fashioned of *ol* blood. He wondered if it would have made any difference if they knew.

The dusk deepened; masters and craftsmen walked their families back to their homes, where apprentices and helpers were already hanging shutters and lugging out crocks of water to wash the street as soon as the daily walks ended. *Quarm* oil maps with floating wicks began to flicker feebly in the upper stories, brooms scraped the wet street and sent the water chasing along the gutters, and heavy slab doors slammed.

Inez Prolynn, 314, brought a food tray and lit a lamp for him. She was a younger model of Nissa Borgley, gracious but subdued, a journeyman baker's wife who would someday be a highly proper baker's wife. Farrari had not eaten since morning, but his appetite was not sharpened by the pungent odor of spiced meat. He munched absently on a thin slice of hard bread and watched the street below slide quietly into darkness.

Finally one of the apprentices came to close the shutters. Farrari asked, "Did you ever see an *ol*?"

"Nope. I've wondered why they don't use them for servants and laborers in the temples and palaces. Maybe the *olz* can't do anything but tend crops and cut trees and things like that, but you'd think they could learn. No, I never saw one."

"How would I go about talking with the coordinator?" Farrari asked.

The apprentice stared at him. "You ask permission of your immediate superior, and he passes the request to his superior if he has one, otherwise directly to Peter Jorrul, and Peter asks the coordinator if he'd like to talk with you. Unless someone along the way decides you're being silly, which is likely."

"I haven't time for that bureaucratic nonsense," Farrari said. "I want to talk with the coordinator tonight. How do I go about it?"

"You're CS," the apprentice said thoughtfully. "Maybe the regulations don't apply. I'll ask Gayne." He returned a short time later and said, "I guess the regulations don't apply. Gayne talked with Enis Holt. You met him?" Farrari nodded. "Enis says if you want to talk with the coordinator we'd best let you talk with the coordinator, only he thinks Peter Jorrul will want to listen in. The coordinator is on his way to field team headquarters. Enis will call back when he gets there."

"Thank you," Farrari said. "Do you have anything for me to do?"

"Do?"

"To help out. Just because I'm CS doesn't mean I'm used to sitting around with nothing to do."

"There's plenty to do," the apprentice said fervently. "Anan and Nissa and Haral will be gone

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until tomorrow night, at least, and we have to make like a bakery. Come and ask Gayne."

VII

Large, circular, dried leaves of a choking pungency were stirred slowly into boiling water. They gave off a gummy pale green scum that rose to the top in unseemly globules. When a measure of the scum had been skimmed off, combined with half a measure of melted animal fat, and beaten in a grain crock until the entire crock was filled with an iridescent, bubbly froth, the *Rasczian* baker had an ingredient better than the finest levening agent for bread and cake.

Unfortunately, his flour was deplorable—coarse, uneven, ineptly ground from a miserable food grain. Despite this, the magic of the froth produced an amazingly light bread.

"And if we had a decent flour," Gayne said, "we could make the finest bread in the galaxy. If this world ever qualifies for Federation membership, guess what'll be the first export?"

"IPR agents," Farrari muttered.

He'd been assigned the job of beating the scum into a froth. He wielded the wood paddle furiously but ineptly; long before the froth neared the top another crock would be ready for his attention with the apprentice who measured out the ingredients standing by.

The massive fire chambers were deep, rectangular openings, each with its own chimney. The ovens, which looked like elongated flour crocks lying on their sides, were set in the openings on stone supports. The fires of oily *quarm* wood bathed the cylindrical ovens with heat, and into them were placed the enormous loaves for baking. The dough was arranged on long strips of perforated metal that slid into grooves in the ovens. When the baked loaves were removed they were three meters long and more than a fourth of a meter in diameter.

From the oven the loaves were taken to a long cutting table where each was carefully aligned with marks indicating a *Rasczian* unit of measurement, sliced into sections for marketing, and packed into woven baskets. The end pieces were tossed into a bin near the door, and at intervals during the night wagons arrived from various military garrisons situated near Scorv and the accumulated loaf ends were weighed out and paid for. Gayne's bread slicing attained the level of an art: with one graceful stroke he drew the long, heavy knife through the loaf, exerting downward pressure and a slicing motion simultaneously. The apprentices, when they took over the job temporarily, produced clean and accurate cuts, but they had to use a sawing motion to do it.

Farrari contemplated a career as

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an IPR baker's apprentice with horror. These people had time for little more than fulfilling their native roles. They'd joined the exotic IPR Bureau, invested years of their lives in the most exacting training the Bureau could devise, achieved agent status, and their reward was unending drudgery.

He wondered aloud why IPR hadn't devised labor-saving machinery for them as it had for the mill: a mixer, for example, to beat the scum into a froth; a bread slicer; a power oven that wouldn't require constant stoking with *quarm* wood.

Gayne shook his head. "We've tried it. A beater produces a beautiful froth in an instant—and the bread won't rise. A mechanical slicer is too perfect—no two slices made by hand are identical, they *look* different, so we decided not to take the risk. *Quarm* wood is a royal monopoly, and if we suddenly stopped using it, or began to use less, some high official of the *kru* would become curious. And a power oven would take just as long to bake the bread. If it didn't, the bread would be different. No, there isn't any other way. Besides, there's a long-standing custom that wagoners calling for bread have to come into the bakery after it and load it themselves. We can't change the custom, and what they see while they're in here has got to look like a *Rasczian* bakery."

Farrari flexed an aching arm, set his teeth, and attacked another crock of scum.

Finally Inez Prolynn came for him, led him to a storage room at the remote corner of the house, through two concealed doors, and into an underground communications room. On the screen were two faces: an imperturbable Coordinator Paul and a scowling Peter Jorrul.

"Here's your interview," Inez said. "If you'd like it to be private—" She turned away.

"Stay if you like," Farrari said. "I don't deal in secrets, I just keep the authorities busy turning down my suggestions."

Jorrul's scowl deepened: the coordinator grinned and said, "Well, Farrari, what do you have for me to turn down now?"

Farrari seated himself in front of the screen. "This morning—or maybe it was yesterday morning—I had an idea about that relief carving on the Life Temple."

"Peter told me about it," the coordinator said. "A very interesting idea it was. Unfortunately—"

"Now I have another idea. What would happen if we substituted a carving of some *olz* for the new *kru's* portrait?"

"It wouldn't work," Jorrul said. "No one would know which *ol* the Holy Ancestors were choosing. Even the *rascz* who work with them can't tell one *ol* from another. We can't, either, except for a

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few of our agents who live with them."

Farrari said patiently, "Not one *ol*. A group of them. *Olz* in the abstract. A reminder to the *rascz*, a permanent reminder, that the *olz* are still with them. I understand that the general population is only vaguely aware of that—that very few of the *rascz* have ever seen an *ol*. It's time that the Holy Ancestors brought the *olz* to their attention."

Jorrul was staring at him; the coordinator stroked his chin thoughtfully.

"It's another interesting idea," Jorrul said. "Unfortunately—"

"You suggested that we enlarge a three-dimensional fix and cast it in plastic metal," the coordinator said. "Graan thinks it could be done, but he has no idea of how long it would take, or how many castings he might have to make before he gets a satisfactory one. I'll tell him to select a teloid of some *olz* and have a try at it."

"Tell him to use a teloid from a remote village," Farrari said, "and to touch it up so there'll be no possibility of identification. Maybe the *rascz* can't tell one *ol* from another, but once an *ol* gets his portrait on the Life Temple his features will become memorable."

"If we were to do this now, we'd spoil the impact the switch might have at a later date when it might be really useful," Jorrul objected.

"We'll consider that," the coordinator said. "At the moment we have Farrari's idea and a couple of critically important if's: *if* an acceptable casting can be made, and—since time is running out on us—*if* it can be made in time, then we have the option of whether or not to use it. Frankly, I have some doubt about the value this notion will have later on. Imaginative as Farrari undoubtedly is, he's certainly not unique, and we have to remember that there are now several hundred Cultural Survey officers and trainees at work at IPR bases. Sooner or later one of them will come up with an idea similar to this, there'll be a full review of the situation, and when a review takes place a new rule is never far behind. There wouldn't be any point in saving Farrari's idea for a more favorable occasion if by that time we'll be forbidden to use it."

"How can you use it without having it reviewed first?" Farrari asked.

"We can't, except when time is a critical factor—as very fortunately it is. The procedure is always the same: I have to file a statement of intent with the sector supervisor, and if he doesn't reject it out of hand it moves up the chain of command until someone disapproves. In the meantime, since the opportunity would be lost if we didn't act at once, I can use my own judgment until I receive specific orders. With luck we could have your phony carving on dis-

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play before we were told that we mustn't do it."

Jorrul said sourly, "The only reason there isn't a regulation about technography is because no one has thought of using it."

"I wouldn't consider it now if it were merely a question of substituting another aristocrat's portrait," the coordinator said. "At best that would only forment dissension among the aristocracy and the winner might be sufficiently angry, or frightened, to destroy the little progress that's been made. But a portrait of the *olz*—" He paused. "Now *that* has potentialities. I don't know what they are, but I'll put all the teams to work looking for them, and I'll get Graan started on that casting. Then we'll see. Anything else, Farrari?"

"No, sir."

"Peter?"

Jorrul looked at Farrari for a moment, started to speak, and then shrugged and shook his head.

"All right, Farrari. I'll let you know how we make out."

The screen went blank. Farrari thanked Inez and returned to his crock of scum.

"Does this go on all night?" he asked Gayne.

"It'll seem that way," Gayne said grimly.

"Isn't there another job that I can do?"

"No."

Farrari renewed his assault on the scum and at the same time began to examine critically the tasks the others were performing. Measuring out the ingredients? The apprentice had no recipe to follow, he had to *know*. Mixing the dough? It had to be stirred vigorously until it was ready—whatever that meant. Shaping it into loaves? All the baked loaves had to have approximately the same diameter. A thick loaf was wasteful; a thin one was cheating and would bring the *kru's* justice down on them. Stoking the fires? The heat had to be precise and even; Farrari would probably burn the place down. He did not even consider slicing the bread.

The only job that required neither skill nor knowledge was beating the scum.

Inez called Gayne to the communications room; Jorrul wished to speak with him. She took his place while he was gone and cut the bread just as expertly. He returned looking glum and spoke into an apprehensive silence.

"They want us to bake a ceremonial cake for the *kru*."

The apprentices groaned; Inez looked sympathetic. "And—present it?" she asked.

Gayne nodded. "Take it to the palace in the morning. As if getting the bread out shorthanded wasn't enough."

"You could take Farrari," Inez suggested.

"So I could. All right—I'll take Farrari."

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"Take me where?" Farrari demanded.

"To the palace. To present a cake to the *kru*. When you've finished with that stuff Inez will give you a haircut. She's on watch, she's got nothing better to do anyway. Then she'll give you a lesson in how an apprentice behaves while his master presents a cake to the *kru*. If you can learn to walk and to bow in one lesson—especially to bow—I'll take you with me."

Farrari said bewilderedly, "A ceremonial cake—"

"It's something every good *rasc* does from time to time," Gayne said. "It's a kind of voluntary, token tribute. When the *kru* is in Scorv he has a daily audience at which he permits his subjects to honor him with gifts."

"The *kru* is dead!"

Gayne grinned. "That's why they're sending me. It should be a very interesting audience."

Farrari walked dutifully at Gayne's heels and performed the short, gliding steps he'd practiced for an hour the night before. Cradled in his arms he carried the *kru's* ceremonial cake, a pastry baked to a secret recipe that some time in the remote past had pleased a *kru* and that owners of Borgley's bakery had guarded and reserved for *kruz* forever after. It looked nothing at all like the other cakes the bakery had turned out early that morning. It looked, in fact, like a segment of bread, round, of the standard diameter, and trimmed to the *Rasczian* unit of measurement.

But it was a highly special cake. Using a small hand mill Inez had reground the flour over and over, and the resultant pastry was unusually fine-grained. It was also cloyingly sweet. It was wrapped in a white cloth on which Inez had drawn meticulously several black crests of the *kru*, and Farrari was ordered to carry it just so, and to walk thusly, and to bow properly and remain bowed while Gayne presented the cake.

As he followed Gayne he should have been mentally rehearsing the presentation scene, but instead he thought about architecture.

He postulated an old, old city, built by master builders who laid down the massive paving stones and erected the tallest buildings, ponderous structures fashioned of enormous blocks of stone, each surrounded by its own spacious, poetically landscaped grounds. They built both high and low: the Tower-of-a-Thousand-Eyes—but not the Life Temple that surrounded it—and the bubbling conduits through which the city's wastes were washed to the river. At intervals along the main thoroughfares stood water houses, each with a lumbering *narmpf* turning the wheel that pulled the scoops of water from a deep well shaft. These emptied into a stone trough, from

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which women filled their crocks. The overflow poured into the underground conduit system. It was a clean city, and those master builders had built for the ages.

Under the pressure of a growing population, the later builders added another type of structure. Smaller builders of a gracefully decadent style crowded all of the old city's vacant land. The spacious gardens vanished, the wide avenues were reduced to cramped streets laced by narrow alleys. The original, massive structures stood like the lonely surviving giants of a decimated primeval forest, crowded by inferior second-growth trees.

A troop of cavalry passed them, the second since they started the climb to the hilltop. The soldiers rode in their parade formation staring haughtily straight ahead, each with one bare, muscular arm poised with a spear from the bundle on his saddle. They swept past, the spirited *grilz* prancing and braying and tossing their horns.

Gayne slowed his pace. "Things are building up," he muttered. "That's ten troops in less than two days. Perhaps this isn't a good time to visit the inner city. On the other hand, if we don't go now, we won't know how they handle gifts to a dead *kru* until the next one dies. And it was an order."

Farrari paid no attention to him. Ahead of them stretched the one majestic old thoroughfare that had survived. The huge paving slabs were badly worn, but the street ran straight to the center of the city, where the Tower-of-a-Thousand-Eyes loomed starkly above the huddled mass of the Life Temple.

Gayne muttered, "Come on. Stop gawking like a tourist."

Which was unfair. Farrari was a new baker's apprentice from Baft, the town that stood at the edge of the *lilorr* where the river plunged into its canyon, and any young man newly arrived in Scorv would be expected to gawk. He had been told that.

They moved on, and for a time Farrari obediently kept his eyes at street level.

A wagon loaded with the cloth-covered bread baskets that now were sickeningly familiar to Farrari passed them on its way to one of Borgley's retail connections. Bakers were the only craftsmen who distributed their products wholesale, this because the bakeries were concentrated in the suburb at the foot of the hill—which meant that the tons of *quarm* wood, flour and other ingredients that they consumed did not have to be hauled up to the city. The bread did, but bread was light.

Apprentices saluted Gayne with averted eyes. Other journeymen greeted him politely, and he conducted himself humbly when he met a master craftsman, whatever his trade. None of them paid any attention to Farrari, though he no-

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ticed that apprentices greeted each other with animation when not inhibited by the presence of a journeyman or master. Women, shopping for the day's viands, stepped aside for them, as did the daughters, or servants, who followed them with crocks and baskets.

At an intersection Gayne slowed his pace again. "I haven't seen a nobleman this morning," he muttered. "The servants aren't out, either, which is stranger. But we can't stop now—too many people have seen us."

They overtook a string of *narmpfz* being led to a butcher's establishment; the gate to the courtyard stood open and the lead *narmpf* was being coaxed past it with a handful of leaves. These were range animals, unaccustomed either to people or to cities, and the powerful bodies were tensed, the small heads wagging in terror as though they sensed their fate.

Farrari assimilated a bewildering melange of impressions: a master and his wife in deep meditation over a silver ornament that a smith displayed in a cushioned box; an apprentice standing in a sidestreet wistfully gazing at an upstairs window where a girl's head jerked from sight as Gayne and Farrari approached; a potter gleefully giving his infant son, or grandson, a lesson at the wheel. Farrari's thought of the previous evening returned to him, and he whispered, "They aren't monsters!"

They were approaching the square of the Life Temple and the Tower-of-a-Thousand-Eyes. The temple's creamy marble glowed dazzlingly under the high late-morning sun, and even the foreboding black of the tower glistened resplendently all the way to its blunt dome where the once-burnished metal had long-since weathered and corroded. Farrari stared at the distant tapestry, trying to make out scenes, until Gayne's scowl told him that he was gawking again.

Where the street debouched into the enormous square the way was barred; a line of the *kru's* soldiers stood slouched at attention while behind them a troop of cavalry tried to hold its *grilz* in formation. They had to detour widely in order to reach the *kru's* palace, and they made their turning, reached a narrow cross street, and turned again.

Then the trumpets sounded.

No clarion calls these, but deep, nasal, sputtering honks. Gayne came to an abrupt halt and looked about wildly, muttering involved *Rasczian* profanities. People poured—erupted—exploded from the buildings. Farrari blankly looked at Gayne, looked about him, looked at Gayne again, and the street was filled. The *rascz* dropped what they were doing, whatever they were doing, and rushed to the street. Here a mother carried a half-dressed child hastily wrapped in a blanket, there a

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servant absently held a long stirring paddle on which liquid glistened. A cobbler carried a shoe, a metal smith an unfinished goblet, a tailor a long, threaded needle.

It was a silent crowd. Farrari had no difficulty in hearing Gayne's whisper. "We're in for it. Whatever happens, stay close to me."

The trumpets continued to sound, and from remote parts of the city came sputtering replies. With the surging crowd Farrari and Gayne moved back to the street they had just left and into the temple square. The guard had retired; as far as Farrari could see in any direction the streets were filled with silent, purposeful citizens, all moving toward the Life Temple. Farrari shifted the cake to a vertical position, where he could better protect it from the crush of the crowd, and concentrated on following Gayne.

Then he noticed the temple.

Before the entrance was a broad, elevated terrace, and on the terrace were the massed ranks of *Rasczian* nobility, their garments a dazzling white with vivid splashes of color. The old *kru's* tapestry still hung over the facade. The odd, protruding stone facings of the tower that had long puzzled him he suddenly identified as balconies, and on one of them, high above the tapestry, stood the imposing figure of a priest flanked by trumpeters.

Engrossed by the glittering pageantry into which he had been plummeted, Farrari kept his eyes on the temple and drifted with the crowd. He stared only for a moment, he thought, and when he wrenched his gaze away Gayne had disappeared. He stood on tiptoe, searching for a glimpse of Gayne's journeyman's hat, but journeyman's hats were everywhere. He tried to force his way back toward the entrance to the square and abandoned the idea after one frantic attempt.

He was alone among the massed, silent population of the city of Scorv, and to his surprise he felt no alarm. The crush of the multitude was its own guarantee of safety. The soldiers massed at the sides of the square were as comfortably remote as the priest on the balcony, and on this day no one had eyes for an humble apprentice.

He continued to drift with the crowd. Small eddies set up in it, as though the citizens were jockeying for position and at the same time pressing to get as close to the temple as possible before they collided with those entering the square from the opposite side. Farrari suddenly became aware that his neighbors were exerting themselves to make room for him. The cake, with the *kru's* flamboyant crests, had caught their attention. His impulse was to drop it the moment something happened to catch the crowd's attention, but he did not dare.

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The trumpeters on the balcony lowered their instruments; those in the distance played on, sounding like faint, long drawn out multiple echoes, but finally one by one they went silent. The hushed suspense, the mutely swelling expectation, became so tense that Farrari feared to breathe. Then the priest on the balcony leaned forward, arms upraised, and began to speak. His first words were a subdued murmur; suddenly he screamed a rhythmic chant, let his voice sink to a murmur, screamed again. Farrari strained to recognize an occasional word and understood none.

The harangue ceased; the tapestry was lowered and folded reverently. An unadorned white cloth was drawn over the blank facade. At this point, according to Prochnow, the ceremony should have been adjourned to give the Holy Ancestors time to deliberate, but the priest, in a dramatic change of delivery, raised a bellowing supplication. During his frequent pauses the crowd occasionally muttered a half-remembered response but more often it seemed to miss its cues, and the priest's bellowing took on overtones of anger.

The cloth was lowered and raised again; the facade was still blank. The priest resumed his bellowing. Five times this happened, and after the fifth time the cloth bulged and rippled as priests struggled behind it with the heavy carving.

The sun had become insufferably hot. Farrari's body was soaked with perspiration under his leather jacket, perspiration ran down his face from the tight-fitting cap, and there were widening damp patches where his hands clutched the *kru's* cake. He began to feel faint, and he marveled that the *rascz* seemed so unaffected by the heat.

The priest's final supplication terminated in a reverberating shriek. The cloth was lowered, the Holy Ancestors had spoken, the portrait of the new *kru* stood unveiled to his worshipful subjects. The crowd's response was the upwelling of a thunderous murmur—more an expression of relief that the long ordeal had at last ended, Farrari thought, than of homage to the new ruler. The nobility and the priests surged toward the temple, and in the crowd people turned away and there were faint stirrings indicating that somewhere far to the rear the movement of dispersal had begun.

Farrari had lost interest. The sudden realization that his splendid idea had not only come too late but wouldn't have worked anyway had completely deflated him. There was no way to install the fraudulent relief so that it would be unveiled at the proper time. "So much for Cultural Survey ingenuity," he thought bitterly.

He followed the still-silent crowd and began to look for Gayne. The

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IPR agent would be aware that Farrari's safety would diminish rapidly as the crowd thinned, and he would probably wait for him at the entrance to the square. If not, Farrari would wait there for him. As an apprentice accompanying a journeyman he had been ignored, but if he were to retrace their route alone he might attract a disastrous amount of attention to himself.

Just ahead of him the crowd's movement halted and faces turned. A short distance to his left Farrari saw a priest mounted on a glistening black *gril*. He was forcing his way through the crowd, and he was looking directly at Farrari.

Farrari averted his eyes and sternly told himself not to panic. Novice he might be, but not even a novice could make himself so conspicuous that a priest would pick him out of a crowd with one glance.

But the priest had. He turned his *gril* toward Farrari, blocked his way, and leaned over to shout at him. Farrari did not understand the words, but there was no mistaking the tone of voice. It was a command.

He did not see the priests following on foot until they surrounded him. They led him toward the temple with the mounted priest riding ahead of them. He had no notion as to what could have gone wrong. He only knew that he was on his way to an inquisition in a language that he understood only slightly and did not dare try to speak.

He felt very much alone.

TO BE CONTINUED

The Analytical Laboratory

NOVEMBER 1970

PLACE	TITLE	AUTHOR	POINTS
1.	The Tactics of Mistake (Pt.2)	*Gordon R. Dickson*	1.47
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THE EDITOR.

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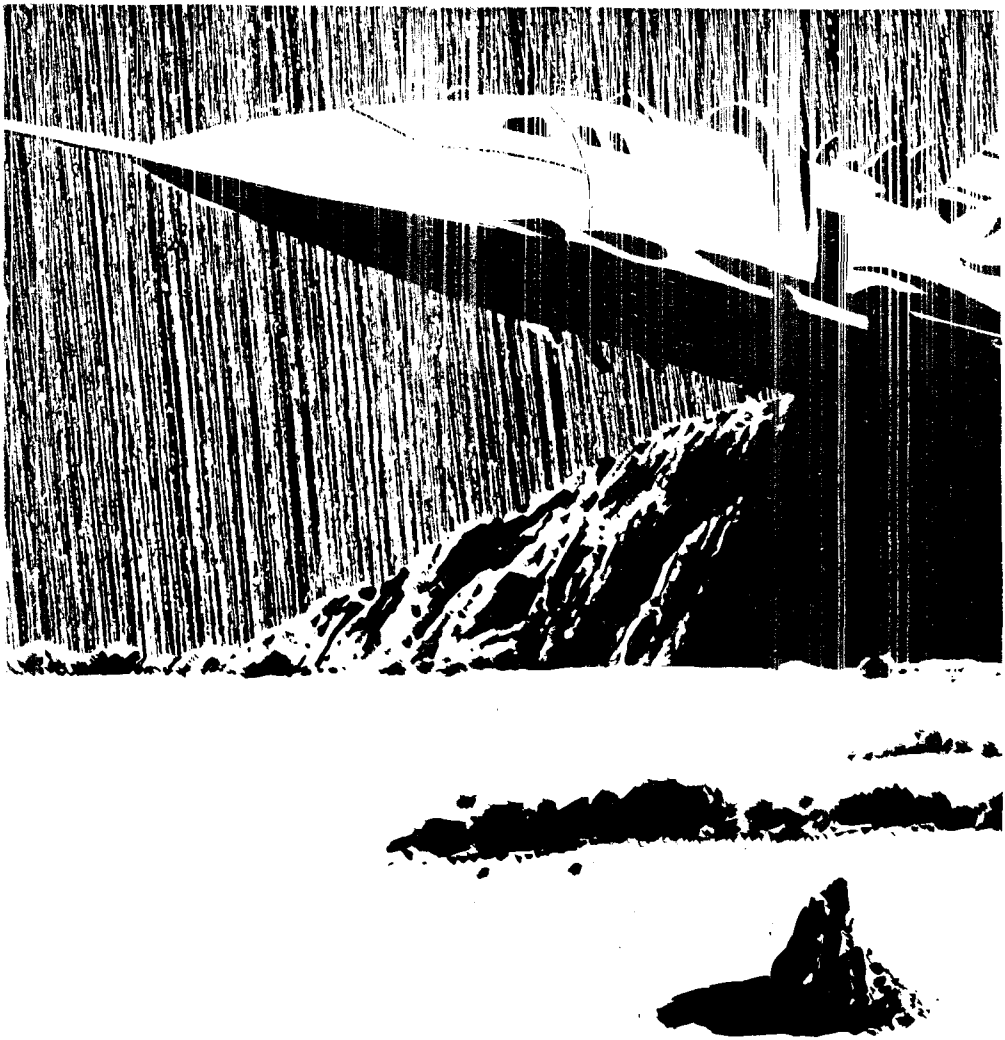

Many a time, it's what a man knows that keeps him from learning!

JOSEPH GREEN
Illustrated by Vincent di Fate

WRONG ATTITUDE

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"You're the physicist, Buzz. Can we make it go?" Ed Alderman asked, his deep bass voice deliberately reasonable and friendly.

Buzz Baxter tilted his lean frame back in the too-tall and narrow control chair in weary patience. He was bone-tired and irritated, but the thought that he had to accept orders from Ed for six more years kept him civil. "I honestly don't know. This is a smaller fusion engine than we thought possible, and according to what I know of plasma confinement it can't work. Presumably it does, somehow. I need more time."

Ed gave him a cool, level stare. He was the only member of the team with a military background, apparently the reason he had been selected as commander of the first interstellar expedition. He had also taken a minor in physics, making him back-up man to Buzz in that field. But they had discovered in their first year out that the preflight psych matching tests were faulty. The short astronaut and the tall physicist got along best at a respectful distance. There had been no major problems during the six slow years they crawled toward Alpha Centauri, but Buzz often felt that was only because Interstellar B was available to each married couple every third week. He and Elinor, and Ed and Jan occupied the A spacecraft together only one week in three.

"Buzz, you know we have just four more days. After that it's short meals and reduced oxygen all the way back. Marjorie says positively no, her tests show our group stability factor as just above the red line now. We leave on schedule, with or without understanding this confounded miniature power system. And, with no profit to show, we just may be the first *and* last expedition. Can I help you in any way?"

Buzz shook his head immediately, and saw that the quickness of the rejection jarred Ed. But there was no point in bringing in another person who knew less than himself; Elinor provided all the physical help he needed. Her work as expedition biologist was over. She had taken numerous soil samples from the surrounding area, thoroughly searched the broken ship, and photographed and measured every personal use artifact she could reach. Neither on planetoid or ship was there any trace of life. She had been assisting her husband for the past three days.

"All right; I'm going to send the daily report up to Jan." Ed pulled on his helmet and turned toward the air lock. Buzz knew their commander wanted some encouraging news for Jan, who would start it on its four-year journey to Earth. He watched Ed enter and manually close the inner door. The fact that the engine room had its own air lock was a lucky break for them, and a good indication of the differ-

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ences in thought patterns. Humans would never have installed two air locks on such a small spaceship.

Elinor returned from what they had decided was the spare parts room, carrying her camera. Her long brown hair was pulled into a severe ponytail, and there was a smear of dust on her left cheek. "All through with the recording and inventory," she said, in the low voice that always soothed his taut nerves. "Ed seems to be getting a little impatient with us. Sure you shouldn't have let him help?"

"I'm sure. Let's recheck the circuitry in our patchbox and make another run."

Elinor took the meter leads and started checking the contacts he indicated. It had taken Buzz two weeks to isolate the drive and its master console, tie in a battery from their shuttle for control power, and activate the unit. Now the drive's moving parts, primarily a series of control rods, moved smoothly back and forth in their cylindrical vacuum chamber. He could even release deuterium and start the heating process that would turn it into a plasma. And there he had stalled, completely lost. The alien's magnetic field was totally inadequate, and he could see no way to strengthen it. Long before the hydrogen heated to the required 80 million degrees Kelvin it blew away in tattered streamers. There was something basic in the operation of this device he did not understand.

Buzz confirmed Elinor's quietly spoken checks with low grunts, his mind elsewhere. They had used up their allotment of luck; now they had to depend on ability. After six slow years of flight the two spaceships had passed by Proxima Centauri closely enough to be certain it had no planets of any size, and found only scattered rocks around the K5 component of the twin suns. They had spotted this unnamed planetoid slightly smaller than Earth's moon, circling in lonely elliptical orbit 120 million miles out, when they approached the G2 star. Far too small to possess an atmosphere, it had seemed only a barren sphere of rock, but they had orbited and started scanning because it was the only solid body of any size at all . . . and found the wrecked ship on the second day.

They would hear the acknowledgment to their jubilant message announcing proof of other life in the galaxy during the fifth year of their homeward flight. But they could imagine the mingled joy and fear that would sweep over the planet; they had experienced it in miniature themselves. Men had walked on Earth's moon, on Mars, on Jupiter's Ganymede and Callisto, on Saturn's Titan, in a wasted search for life. Unmanned probes had explored the hot surfaces of Mercury and Venus, the seas of frozen hydrogen, helium and methane covering Jupiter and the other

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gas giants, the cold desolation of iron and rock that formed Pluto, and nowhere in the solar system was there the slightest trace of life. The believers in the space program, after years of periodic ups and downs, had persuaded the World Science Council to finance the greatest trip of all, to the nearest star. And now the major question of the past century was answered in the affirmative, and, if they could carry back knowledge worth billions in research money, the space program would never again be in danger.

Both the joy and fear had faded when they landed their small shuttle and explored the alien vessel. It had been a short, sturdy cylinder designed to land nose-up on six spidery legs; apparently they had not developed the shuttle concept. On this landing two of the legs had come down on the roof of a large hidden cavern. The thin rock had collapsed after the engines were off and the vessel had fallen on its belly. The center had impacted on the farther wall of the cavern, breaking the body almost in two. The front end was a twisted maze of titanium alloy which the humans had neither the time, or equipment, to untangle. The back third was relatively intact, with most of its length suspended over the open cavern. And the back contained six comparatively small nuclear rockets and a heavily shielded room with a cylindrical vacuum chamber that had to be their source of power.

Steve Lord, their geologist, had found the imprint of the alien's companion ship only a few hundred yards away. By the time-scale worked out on the Moon, the prints were less than eighty years old. It seemed clear that another intelligent species, one taller and thinner than *Homo sapiens*, but biologically similar, had dispatched an exploration party to Alpha Centauri. When one ship suffered a disastrous landing, the second came down and took off the survivors, a close parallel to their own planning if one Interstellar failed.

The aliens were technologically ahead of Earth, but only slightly . . . which meant it should be possible to learn from them. Man had explored beyond his solar system at the earliest possible moment, using relatively crude fission-powered ships with supplementary ion drives. The aliens had fusion power plants small enough to be practical in a spaceship. This seemed the one item that might give Earth a large gain in technology, and, since it was far too heavy for the shuttle to lift, they had to learn its secret on the ground. Ed Alderman wanted Buzz to produce, and was bearing down hard. Buzz had felt that he was progressing nicely, until he discovered they apparently contained controlled hydrogen fusion with a magnetic field that wouldn't hold a metal wrench off the field.

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The air lock opened again and Steve Lord came in, carrying his sample case. He unsuited and joined them. "Any closer to solving the problem, Buzz?"

"Afraid not," Buzz answered. "Learn anything new yourself? Find the missing bodies?"

"No, I'm convinced they preserved their dead and took them back home, wherever that is. Anyway I can be of help to you and Elinor?"

"Yes, you can keep Ed off my neck," Buzz said with a grin. Like Elinor, Steve had collected all the samples they really needed and was saving the analyses to occupy time on the tedious trip home. His wife Marjorie, the crew doctor and psychologist, was orbiting in Interstellar B. The shuttle carried four, and the commander, physicist, biologist, and geologist had been the natural choices for the landing party. The doctor and Jan, the astronomer, were the two least needed on the ground.

The engine room was still airtight, and they had filled it with oxygen from the shuttle's reserve tank. There was plenty of working room, but little Steve could do until Buzz decided on their next move. And for that he needed to understand the theory behind the alien's plasma control, a concept still far beyond his grasp.

Elinor finished her checks and Buzz made another run, with the same negative results. Long before the hot gas reached the plasma state it broke the weak magnetic grip and fled out the pipe he had rigged to the exterior vacuum.

"Don't you need some rest?" Elinor asked sympathetically as he let the power die.

"Maybe I do," Buzz said wearily as he turned and started suiting up. "I'll take a short nap. But first I want Jan to check a few items in our own manuals."

Buzz stepped out of the small air lock into the bright light of Centauri G2, small at this distance but otherwise similar to Sol. It had been early afternoon when they landed and they would be leaving just before dark; the planetoid had an eighty-day rotation. The K5 companion was hidden on the other side of this barren round rock, but Proxima was visible as a very bright star low on the horizon.

Instead of entering the shuttle immediately Buzz walked slowly around the tail of the wrecked ship, noting again that at less than two hundred feet in length it was far shorter than the Interstellars, though almost twice the diameter. There was a subtle alienness to the look and feel of the design that jarred on the senses, making him realize there was a remarkable resemblance between the crudest stone ax and the most modern hand tool; both were designed by and for humans. He wondered if it would be

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possible to meet an extraterrestrial without deep-seated revulsion, without feeling unthinking, almost instinctive, dislike.

Buzz saw nothing that would help him with his present problem, and finally entered the shuttle and called Jan Alderman. There was just time enough for her to look up the items he wanted before the interstellars passed below the horizon. The fact that the shuttle had fuel for only one more round trip, and Ed insisted on reserving it for emergencies, was a nuisance. He needed several items they had not brought down with them. But the entire expedition functioned under stringent limitations, as the space program had from its inception. The huge weight of life support supplies and regenerative equipment left little room for luxuries, or space fuel for a shuttle they might never have used.

Ed returned to the more roomy wreck while Jan was quoting the items Buzz wanted. Buzz learned nothing that could help him, and changed the radio to suit-relay operation and followed Ed. In the spare parts room, where Elinor had been working and where they slept for privacy, he shed his suit and lay down on the improvised bunk. He was immediately wide awake, though still intensely tired, and had to make a conscious effort to relax. The tall aliens had taken most of their spares with them, but several that were left bothered him. The modular components, like the spare controllers, were easy enough to understand, but the function of items such as the wrist-thick silvery rings with the hundreds of little disks attached to the inside was a mystery. There were twenty-two of those rings, eighteen almost six feet in diameter and two each of four feet and two feet. Their function, whatever it was, must belong to the wrecked front end of the ship. He had seen nothing in the engine room that remotely resembled them.

Buzz realized he had been asleep when Elinor gently shook him awake. He staggered erect, ate the concentrates she had warmed for him, and returned to the baffling fusion engine he was never going to understand. It was small comfort to realize there were scientists on Earth busily working to reduce the present huge hydrogen fusion machines, and in twenty years they might have one small enough to power a ship. That vessel would be an ocean submarine tanker, not the first spaceship headed for Munich 15040.

The aliens' equivalent of a computer was located in the control room at the front of the ship, and had been smashed into scrap. There was no other source of recorded information about the power supply. Any printed sheets, or manuals, they possessed had gone back with them, leaving only the actual machinery to work with. The problem

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had to be solved here and now or not at all.

Elinor moved past him to her position at the master control console. Marjorie Lord was the official psychologist, but Elinor, her backup, was actually better at human relations and did more to keep harmony among the six isolated humans. Buzz knew that, if the pressures of command caused Ed to lean too heavily on the crew's physicist, Elinor would quietly speak to each man alone, in some intuitive method, uniquely her own, easing the tension. Marjorie, recognizing ability that was real rather than academic, had quickly yielded most of her mental health work to Elinor. She still performed the official psychometric tests, and functioned as doctor and general helper to the others.

Buzz had managed to interpret the marks on the strange oblong raised dials, and with a grease pencil had written the English equivalent figures on the glass faces. The sophistication of the equipment was apparent in the small number of monitoring units and the simplicity of the physical control system. With the patchbox and the operational controls on the console he could manage a heat-run up to the point where a self-sustaining fusion reaction would occur—if he could contain the plasma. The key lay in the magnetic field, and there he had been unable to follow their reasoning, or understand the design. He was like a man with only a basic knowledge of radio suddenly confronted by a transistor; he could see what it did, but, with no understanding of semiconductors, not how.

Buzz shook his head, as though trying to dislodge the preconceptions that were keeping him from the truth, and returned to work.

At the end of two more days, relieved only by two short naps and hurried bites of food, he was no closer to a solution than before. When he wolfed down his breakfast on the third morning and hurried to the console he knew it had to be within the next few hours, or not at all. He hadn't shaved in four days, or bathed since landing. Fatigue was a constant companion, gnawing at his strength. Today he had to succeed, or clear the way for Elinor to enter the chamber with her cameras. But he had little faith that even Earth's best physicists could learn more from a photographic record than he could from the actual machinery.

Ed and Steve were in the storeroom, selecting the few pounds of alien equipment they could carry back with them. As Buzz reached for the patchbox Elinor stopped him with a tentative touch on the forearm. "Buzz, I've been thinking. The problem here, isn't it that the coils are just so small they can't produce a magnetic bottle with

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sides strong enough to hold the deuterium in place while you heat it into a plasma?"

Buzz grinned, and touched her face with a quick, tender hand. "Bad terminology, but that's close enough."

"Could there be such a thing as a magnetic amplifier? I mean—you're looking for some way to increase the field strength, but does it have to be with larger magnets, or higher currents? Is there such a thing as a device that just . . . sits there and makes the field stronger?"

Buzz frowned, unable to follow her. "If you place a conductor in the field it lessens reluctance and increases magnetic strength, sure; that's one of the basic laws. But you can't have a solid in the same area as plasma."

"No, but I was just thinking . . ." She trailed off into silence as Ed walked up. The short man looked at the day's setup and turned to Buzz. "Any chance you can solve the mystery today?"

"Not one in a million," Buzz replied without hesitation.

"Then you've let us down," Ed said, his voice unusually low.

Buzz whirled around to face his commander, smoldering resentment at last bursting into open fire. He could almost feel the shock of adrenalin pouring into his blood under the stimulus of anger, realized that he had involuntarily clenched his fists, as though the confrontation would be physical. He opened his mouth and found himself stammering, as he had not done since childhood. In his mind's eye he saw a red baseline on Marjorie's overall crew stability chart, knew that Ed's condemnation had just taken them below that line, and when he got his twisted tongue under control and told the short astronaut what he thought of him it would dip far lower, past the point of possible recovery. Their real enemies were themselves and tedium, six long years of it still ahead, and it would have been easier by far to fight the tentacles, or claws, of a living alien.

They had known since the first year out that personality problems were their greatest danger. The nominal requirements for food, drink and fuel were easily established; the more complex baseline for a crew's mental health was harder to determine. They had been living with a small safety factor since discovering Buzz and Ed were inimical types, and now even that was gone.

Ed stood waiting for the insubordination that would enable him to relieve Buzz, calmly self-controlled. Elinor said clearly and loudly, "I have an idea!"

Her voice was like a dash of cooling water on rose-red steel. Both men whirled toward her and she went on quickly, "Those large silvery rings with the hanging disks, Buzz; I noticed yesterday that they have little attaching

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points that match the hooks on the ends of the extensible rods in the chamber. If you position the rods the same distance apart, both vertically and horizontally, they could hold up the whole set of rings. And I think you could move them together, or apart, with the rod controls. Of course they wouldn't do anything but sit there on the outer edge of the field, which is why I was asking you . . ."

Almost instantly a design leaped into Buzz's mind, one so obvious he realized he had overlooked it while dwelling too heavily on complexities. If the eighteen larger rings were arranged the length of the vacuum cylinder with the four- and two-foot ones at each end, they would roughly match the shape of the cylindrical magnetic field. They would be suspended just above the coils and there was no way they could contribute to flux flow by supplying a return path, but--

Elinor and Ed were just behind him when Buzz dashed for the spares room, in his excitement forgetting the low gravity and losing his balance as he entered. He recovered and grabbed the first ring, but then realized he had more important work to do and handed it to Elinor. He returned to the engine room, closed the exterior vent, and flooded the vacuum chamber with air. He had to stay at the console and start positioning the first set of rods while they entered and attached the rings. After the first one the work went swiftly, and in an hour they had the entire set installed. Buzz found, as Elinor had thought, that he could change the size of the space they enclosed by bringing them closer together, or spreading them. And he discovered a circuit he had not yet used, that tied the entire set into one automatic control. He hastily changed his patchbox to match the new design.

Ed and Elinor emerged from the chamber, and Buzz closed the entrance panel and manually operated the evacuation vent. Several thousand cubic feet of their precious oxygen vanished into the exterior vacuum, and they were ready for another run.

"Exactly what is it you think we've found?" asked Ed as Buzz started setting the console controls. There was no trace of the commander in his voice; rancor had vanished in the excitement of discovery.

"I'm not certain, Ed," Buzz replied, his mind elsewhere. "Let's make another run and check the effect on the magnetic field. If these rings somehow increase it enough to hold the plasma, we have our answer."

It took only minutes to feed deuterium into the chamber and start the heating process. As he fed current into the field coils Buzz saw the small disks hanging from swivels on the inside of the rings start-

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ing to move, those on bottom and sides gradually lifting until they pointed toward the center of the chamber. At a certain point all the disks began whirling. The field strength needle Buzz was watching, till then barely off its peg, made a substantial jump. At the same time the coil temperature, which had been near its limit, started back down. And the amount of current available to feed the coils suddenly increased.

At the moment Buzz had no time to wonder about the laws of physics he was seeing broken. The cycle continued, more heat being converted into power while the coil temperature remained constant, the extra power increasing the strength of the magnetic field that held the hot gas locked in the center of the chamber. When the temperature passed the 80 million degree mark and the plasma approached the point of sustained fusion, the automatic control on the rings had brought them together almost to their limit. And then the temperature reached the critical point, and, though he knew that operating with their patchbox and jury-rigged system was incredibly dangerous, Buzz was so caught up in the sheer exhilaration of the moment that he took it on over the edge. The white-hot energy of a miniature sun lived and burned within that tiny vacuum chamber, held in check only by ephemeral lines of magnetic force.

Buzz cut off the flow of gas, turned down the heat control until the temperature fell below the critical point, and ten minutes later he was exhausting the bulk of the hydrogen and a few million atoms of helium to the outside.

"And now we can go home," said Ed, in the happiest voice Buzz had heard in years.

"Not just yet; I want to take one of the small rings back with us." Buzz began rechecking his patchbox, though he felt certain the pattern was burned on his brain in lines of fire. "We have to get it into a good magnetic lab to learn how it magnifies an extended field. What I want to know, wife-of-mine, is how you guessed that the rings were part of the chamber's operational equipment and not spare parts."

"Seeing the attaching points on the rings was just dumb luck, Buzz. But I think I know why I connected them with the chamber rods when you didn't. Even though this design is new and strange, you managed to operate it because you knew what had to be there. I didn't, and so I saw how some extra pieces that wouldn't serve any function could be fitted in. I was too ignorant to know the rings couldn't do what they . . . they do! And in this case ignorance gave me a freedom of mind you didn't have. But do you two really think this little jump in technology will impress the World Science Council enough to get another expedition authorized? They may have made

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fusion breakthroughs equal to this one by the time we get back."

The two men looked at her with almost identical expressions of amusement. Buzz crossed the few steps between them and caught Elinor in a bear-hug. She yelped at the unexpected pressure and fought her way out of his arms, indignant but laughing. Steve, who had just entered the engine room from the outside, stared at his three crewmates in mild astonishment.

"Honey, it isn't the small fusion engine we are carrying home," Buzz finally collected himself enough to say. "Don't you realize it's theoretically impossible for those rings to function as they just did? I wasn't looking for a few circles of metal, with spinning disks that would increase the strength of a magnetic field ten thousand times, because I knew no such thing could exist. Now that we know it does we have to find out how, and why, it works and rewrite one of the basic laws of electromagnetism. They'll still be changing the textbooks and finding new applications twenty years after we reach home!"

"And we'll send the word on ahead right now," said Ed, reaching for his spacesuit. He walked into the air lock, still fastening his helmet.

As the door closed behind their commander Elinor smiled at her husband and said, "I wonder what the Munich group will bring back." ■

In Times to Come Next issue features another of Katherine MacLean's stories of Ahmed and his telepathic friend George, "The Missing Man".

In this case the missing man is a computer-programmer systems-analyst who knew all about the environmental control computers that manage a city's well-being. And somebody's found him, and a way to make him think up fun-and-games about how half a dozen minor accidents—if carefully timed in the right sequence—are remarkably destructive.

That, of course, is the trouble with computers; they do what they're told to do—not what they're meant to do!—and always believe everything their sensors tell them. Even the complex "fail-safe," self-checking computer operating the nuclear reactor is really very naïve. It'll believe anything it's told. . .

Ahmed's job, of course, is to find the missing man and his fun-and-games captors before they have another game, with another major reactor—

Finding one missing man among many millions isn't the convenient shortcut to the answer they need—it's just the only way! THE EDITOR.

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POLYWATER DOODLE

Sometimes a man doesn't know what's good for him—like being marooned by a couple of crooks on a desert planet. But you can learn some useful things that way . . .

HOWARD L. MYERS

Illustrated by Vincent di Fate

"You're bad news, Starfuzz," groaned Icy Lingrad, pressing her hands against her beautiful but pale temples. "You're bad news, you're phony, and you're sick-sick-sick."

"I resent your implication that we're totally compatible!" Omar Olivine growled at her. He wished she would obligingly drop dead, or at least shut up. He felt in no condition to bandy insults with his psychotically anti-sexual shipmate.

Ravi Holbein, with his usual smoothness even though his voice had a ravaged quiver, put in: "Among the possible actions we might consider is returning to Douthit Three."

"*NO!*" Olivine and Icy shouted in chorus.

Holbein shrugged weakly. "It was just a thought," he mumbled.

"For one thing," said Olivine, "the Patrol's sure to be swarming around that planet by now. For another . . . well, I hate these withdrawal symptoms as much as you do, but we must be over the worst of the cold-turkey routine. If we went back, and did succeed in landing and get ourselves some superpot fixes, we'd just have this whole miserable routine to go through again. And probably in a Patrol

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prison, without the benefit of deep-sleep tanks to make it easier."

Feeling too twitchy to remain seated, Olivine stood and strode nervously around the control deck of the stolen port-service ship *Glumers Jo*. For a while he stared blankly at the viewscreen's portrayal of the starscape outside. As an ex-proxad of the Space Patrol he had no trouble estimating the ship's position and course after a mere glance at the visible blue-giant beacon stars. The *Glumers Jo* was five days out from Douthit Three, on a bearing Flat External West 14 degrees.

"Let's don't just *sit* here!" snapped Icy.

"And what does the lady suggest?" Olivine asked harshly.

"Sneak back into civilization some way!"

"And how will we do that, with Patrol detectors peeled for us everywhere?"

Icy grimaced, "You're supposed to be brainy, Starfuzz. You figure a way. No, don't. Every idea you have just gets us in a worse mess! You're a put-up job, Proxad Omar Olivine."

"That's a nonsensical lie!" he yelped.

"In fairness to the young woman's viewpoint, Mr. Olivine," Holbein said ponderously. "it does appear that misfortune has dogged our footsteps, since our escape, with a more than random consistency."

Olivine continued to stare at the viewscreen. At last he turned and said, "O.K., we're in this together, so you two might as well know what's going on. I'll give it to you straight."

"Hah!" snarled Icy.

"As an eager young proxad in the Patrol," Olivine began, "I was the willing subject of hours of psychoanalytic probing. As a result, the Patrol's CIT computer knows me about as well as I know myself. It can predict me. It knows what I want, and how I'll go about getting it in a given set of circumstances.

"So it probably wasn't a Patrol goof that enabled us to steal this ship and escape during the process of being transferred from one prison ship to another. It was the kind of opportunity the Patrol knew I would grab. And they knew I would take the ship to Douthit Three for a cargo of super-pot. And that we would rig the ship's fire-fighting system to make a flamethrower to use on Douthit Three's dinosaurs. And that we would store the super-pot in the midship lockhold, where an electric spark was all set to activate the extinguisher sprays which would pour on enough fuel to burn our cargo to ashes, cooking us to the gills in the process.

"That computer rigged the whole thing," he finished plaintively.

"Aw-w-w-w," drawled Icy in mock pity.

"Go to hell," he told her.

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"Most interesting," said Holbein. "It occurs to me that the flamethrower was not your idea, however. Forgive my immodesty, but I believe a remark of mine led us to try that."

"O.K.," shrugged Olivine, "so the Patrol has your mind pretty well mapped, too. They psychoprobe con men as well as cops, don't they?"

After some hesitation, Holbein admitted, "If one cooperates with those who ask questions, life in prison tends to be more abundant."

"Slobs!" snorted Icy. "The starfuzz shrinks didn't get anything but a hard time from *me!*"

"I find it difficult," said Holbein, "to see a purpose, a motivation, behind the Patrol's actions. Surely prisoners would not be permitted to escape without what the minions of the law considered a very good cause . . ."

"They wanted to blow the lid on Douthit Three," explained Olivine, "so the Confederal Council would be forced to go to the expense of putting an armed guard around the planet, to keep people away from the super-pot. Either that, or send in a team of ecologists to do the equally expensive job of exterminating the super-pot weed. It was a political gambit the Patrol used us for."

"I see. However, we've lost our cargo, which limits our ability to perform as lid-blowers," commented Holbein.

"All the more reason for the Patrol to keep us from sneaking down on some civilized planet, where the whole story might leak out," said Olivine. "They'll hold us in secret if they catch us."

"Then let's go to Dusty Roost," said Icy.

Olivine frowned. "I think that's exactly what the Patrol wants us to do," he said. "If they could claim our cargo was delivered to the criminal stronghold of the Roost for gradual smuggling into civilization, it would scare hell out of everybody. So I'm not going to play into the Patrol's hands by going there . . . especially with no cargo."

"A sound decision," approved Holbein. "Speaking for myself, I had doubts about the Roost even when our cargo was intact. While I am not a stickler for law and order, I admit a preference for the companionship of persons who are. Indeed, I had certain expectations that the Roosters might seize our cargo over our recently deceased bodies, as it were, rather than purchase it for coin of the realm."

Olivine shook his head. "We could have avoided that. The Roosters aren't united. They're in gangs, sometimes just one planet per gang, that snipe at each other about as much as they exploit outside commerce. If the right man could consolidate the bunch of them . . ."

He trailed his voice off and

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glanced around furtively at the others, but neither Holbein nor Icy seemed to have paid much attention to his inadvertent revelation. It wouldn't do to let his companions know what his goal was . . . his dream of power.

Yes, he mused silently, he would go to Dusty Roost. But not yet. Not under these circumstances, which would open nothing better for him than, perhaps, a job as a torp for some two-bit gang chief. When he went into the Roost, he would go with power . . . power with which to gain still more power . . . power to make the Space Patrol cringe in fear, and crawl to him on its lily-white belly . . .

"Then we could have played one gang against another to assure ourselves fair compensation for our cargo," said Holbein.

"Yes," Olivine nodded.

"Blosh!" Icy snapped vulgarly. "Quit moaning over might-have-beens, you sticks! We're on a perch *right now,* and I want to know how we get off it!"

There was a silence.

Finally Holbein said: "The young woman has a point, Mr. Olivine. We are rather thoroughly perched. And, as you have so astutely deduced, any action you might take to improve our position would, in high probability, have been anticipated by the Patrol's CIT computer. A bind, indeed."

Olivine couldn't disagree with that. He returned to his chair and sat in glum thought for several minutes.

At last he said, "I can think of only one possibility. I'll step down, Holbein, and put you in charge. I'll instruct the ship to obey your orders from now on, not mine. With you running our show, the computer's predictions will no longer apply."

Holbein looked startled. "Much as I appreciate the honor, Mr. Olivine, I have never commanded a ship before, and would find myself ill at ease in such a position. It also occurs to me that your officer might be among those anticipated by the Patrol."

"Well, hell," exploded Olivine, "we've got to do something! The Patrol might also anticipate we'll get so balled up out of fear of being anticipated that we'll just sit here, like we've been doing!"

"Quite true," murmured Holbein, "but I still cannot bring myself to accept your offer."

Olivine cursed and stared at his knees. But there was no avoiding the obvious. Regretfully, he turned to look at the young woman. "Well, what about it, Icy?" he demanded. "Will you take charge of this tub?"

"Sure, Starfuzz!" she leered. "If you care to risk it."

"I don't have a choice," he growled. "Ship?"

"Yes, sir," responded the *Glumers Joe,* in the unmodulated voice

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of a medium-capacity compucortex.

"I hereby relinquish command to Miss Lingrad, with the instruction that you obey her orders, and her orders alone, as you have obeyed mine in the past. Is the instruction fully understood and accepted?"

"Yes, Mr. Olivine. I await your orders, Miss Lingrad."

"Continue on course for the present," Icy said.

"What's this?" sneered Olivine. "No immediate brilliant action to instigate?"

"I'm going to sleep on it," Icy said, rising from her chair.

"We've wasted enough time already!" he snarled.

"Shut up! I'm boss now, and I said I'm going to sleep!" She whirled and left the control deck.

"This should prove interesting," said Holbein.

"Maybe. At least she had a point about getting some sleep. That's the only escape we have from this cold turkey treatment. We may as well follow her example."

They wandered separately to their sleeptanks. Olivine climbed in his, checked the fluid levels in the nutrient and deepsleep tubes, pulled down the lid over him, and felt the feeder needles snuggle into place in his upper arms.

When he woke he was no longer in the tank. He opened his eyes on a cloudless blue-green sky, and with his facial tissues screaming *sunburn!*

He leaped to his feet and stared wildly about at an arid, sparsely vegetated landscape, scorched under a blazing Type K sun.

Marooned! That psychotic wench had dumped him!

A pack of supplies was on the ground, by the spot where he had awakened. He tore off and read the note attached to it:

"Dear" Starfuzz:

Chuting you into space would suit me better but old Holbein and the ship might have been squeamish about that.

I'm dumping you because I can't trust you. If you could override this ship's brain to take it away from the spaceport, you could take it away from me if you changed your mind. So bye-bye.

Your planet is called Flandna. You're the only carnivore on it, so have fun and . . .

Die quickly,
P. Lingrad.

He wondered numbly what the "P." stood for, having never heard Icy's real name.

II

Groaning, Olivine opened the pack and found a tube of Kwik-eeze. He applied the ointment to his burning face, and in a moment that source of discomfort faded. His other physical and mental miseries were not so easily cured, how-

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ever. The gnaw of withdrawal seemed to feed on and gain new power from his dismay at having been marooned.

And that dismay, by itself, would have been bad enough.

He couldn't recall much about this planet Flandna, and that was a bad sign. If it was a world people could live on with any satisfaction, he would have heard more about it. From his first feel of the place, he sized it up as one of the many borderline worlds that just missed being livable. Air breathable, but a little too thin. Sunlight, a little too hot, and heavy on the ultraviolet. Water present, but too scarce. Native flora and fauna, also on the scarce side, and probably poisonous.

The kind of world, in short, that had often wiped out human colonies with a delayed and sneaky ecologic backlash.

Icy's note said he was the only carnivore on the planet, which meant he'd better watch out for dangerous plants. They probably had means of fighting back against grazing animals, to maintain a balance of population.

Grimly, he examined the contents of the pack.

There, the news was better than he had expected. Icy was at least giving him a chance to survive, so far as equipment would help.

A major item was one of the recently developed rationmakers, into which any alien animal, or vegetable substance, could be loaded for conversion to edible protein and carbohydrate. It also purified water.

Everything else was standard emergency survival gear of types Olivine was familiar with . . . bedding and tenting, sonic knife, nuclear powerblock, heater-cooler, and various incidentals.

But no distress beeper with which to call for rescue. And Olivine was already beginning to feel he would prefer rescue, even by the Space Patrol, to spending much time on Flandna.

Glumly he reloaded the pack, slid the straps on his shoulders and stood up. For a moment he studied the arid landscape, getting the lay of the terrain in mind. Then he chose his direction and began walking.

The one necessity neither the pack nor his immediate surroundings could supply was an adequate water source. That he would have to find. By going downhill, he expected to find water sooner or later.

The hiking quickly became pure torture. Olivine knew part of the trouble was that months in prison had softened him physically. Also, the dismal state of his morale was weakening him even further, but he couldn't fool himself with fake cheerfulness. And there was the heat, and the low humidity which was sucking up his body moisture

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so voraciously that his sweat evaporated before it had time to dampen his clothes.

Under this load of misery, his formerly maddening withdrawal symptoms were soon too trivial to be noticed.

And he seemed to be getting nowhere.

After four hours of hiking with only brief breaks, he could see no improvement in the surrounding land. It was still marlboro of the harshest sort. The vegetation was stringy and dry, where it grew at all. He had seen a few insect-sized fliers, but no other animal life, although he had noticed occasional holes that could have been burrows. He guessed that the animals here, like those of many high-temperature desert climates, did most of their foraging and moving about in the cool of night.

Finally he came upon a plant that was leafier than the others he had seen and promised to contain a fair amount of moisture. He stopped, got the knife, a pair of protective gloves, and the rationmaker out of his pack, and approached the plant cautiously.

It made no move, so he took a tentative swipe at it with the knife, slashing off a small leafy limb. The plant quivered. Quickly Olivine waded in, hacking away with the knife until the entire plant was chopped to pieces. He stuffed these into the receiving compartment of the rationmaker, closed the lid, and turned the device on. It worked with a dim humming sound.

While he waited on it, Olivine inflated the tent and carried all his stuff inside. In almost desperate haste he plugged the heater-cooler into the powerblock and flicked the dial to the lowest temperature reading. A gush of cool air came out of it and he flopped down in relief.

In a moment the rationmaker quit humming and sounded a soft chime. He picked it up and studied the product compartment readouts to find out what the plant had yielded.

Very few ready-to-eat constitutents, he saw, but a large amount of normal cellulose that could be reprocessed through a second stage into digestible molecules. More salts, many poisonous, than found in E-type plants, and all of these could be dumped except the sodium chloride, which Olivine figured he would need at the rate he had been sweating.

The moisture content was disappointingly low: 3.3 cubic centimeters of free water and 1.8 c.c.'s of polywater.

Olivine blinked at this last reading. This was something he hadn't seen before on the readouts of a food analysis-resynthesis device—the separation of pure polywater. Usually the analysis process either left polymeric water as a moistening agent in the cellulose and carbohydrate compartments, or else blasted it into ordinary wa-

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ter. This was one of the advances of the rationmaker, which was reported to represent a breakthrough in this kind of device.

For human consumption, however, polywater was of limited value. It was good for constipation, but that problem Olivine did not have. He flicked the little toggle that would convert the polywater into its more usual, drinkable form. Then, after studying the substances he had to work with, he set the resynthesis formula and reactivated the device.

Five minutes later he was nibbling a little block that felt and tasted like salty ice cream, but that had to be chewed and swallowed like a non-melting food. It left him feeling better, though thirstier, than before.

But his exhaustion, along with the dread of the heat waiting for him outside the tent, kept him from going in search of a plant from which to drain a few more c.c.'s of water. That would have to wait until night, he decided. Meanwhile he studied the directions attached to the rationmaker with care, to see if he was missing any bets in his use of the device. Carbohydrates and proteins were, after all, largely oxygen and hydrogen, so why shouldn't such a device be equipped to break these down into water?

Finally he sighed and gave up. Such a use apparently hadn't struck the manufacturers as desirable. Stretching out on his back, Olivine closed his eyes and slept immediately.

The sun was still high when he woke, and he had to wait five fretful hours in the tent for the cooling of twilight. There was a lamp cap in the pack, which he strapped on his head before starting his downhill trek once more.

The Flandnan desert was coming to life with approaching darkness. He could hear the squeaky calls of small animals as he strode along, and finally got a look at a couple of them. They appeared quite ordinary desert inhabitants, rat to rabbit in size, quite possibly mammalian, and six-legged.

He could not catch one. They did not scurry out of sight at his approach, but moved swiftly out of reach if he came too close. Olivine guessed they were not afraid of being eaten by a larger animal, but were cautious about being trampled on. At last he knocked one over with a well-aimed rock, and processed it through the rationmaker. It yielded nearly a cup of water which he gulped down quickly. Then he dumped the nutrient components, which were too dry to resynthesize into anything edible.

Later, after darkness was complete and he had switched on his cap lamp, he killed another and made a meal off its ingredients.

Once he caught a glimpse of a larger animal, also centauroid in

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structure, that would have resembled an Earth boar, except that it was as lanky as a greyhound. It slunk quickly away from his light.

The coolness, the food, and the sounds of life around him were a healing influence on Olivine's morale. His situation, he realized, was far from hopeless.

All he had to do was stay alive—and the rationmaker should make that simple—until a ship passed close enough to the planet to detect his nuclear powerblock. Two weeks, two months . . . six months at the outside. Space travel disasters were fairly frequent, and an overdue liner always brought search-and-rescue ships out along the liner's route to take a look at such semi-inhabitable planets as Flandna where survivors could be grounded.

Yes, six months at the most, he told himself.

And he couldn't be too sure, with only the light of his lamp, but the terrain seemed to be improving as he marched along. Vegetation seemed more abundant, suggesting more ground moisture. He steered clear of the larger clumps, remembering the warning he had taken from Icy's note.

He muttered a curse at the thought of that beautiful hunk of devious, frigid femininity. If he ever got his hands on Icy . . . well, she had earned all the rough treatment he would delight in dealing her!

He boiled at the thought and his eyes glared angrily as he strode on through the night. The hell of it was, though, that his chance of ever encountering Icy again was extremely slight. The Confederation was too big for that. You met people, separated from them to go your separate ways among the hundreds of worlds, and your paths never crossed again.

And infuriated though he was, Olivine had no intention of ever going looking for Icy, just to punish her for dumping him. Life was too short to waste in search of vengeance . . .

Except, of course, vengeance upon the stinking Space Patrol! What a slob he'd been, letting that crummy do-gooder outfit snow him for so many years, thinking he was king of the universe when they made him a full-fledged proxad! And then hac slapped him down over a little harmless payoff! As if a proxad ought to live on the miserly pay the Patrol gave him!

He was well out of it, even as a marooned escapee from "justice", he told himself bitterly. And given half a chance he'd *show* that Patrol . . .

Something tripped him and he sprawled forward, coming hard against the dry ground. Surprised but not hurt, he tried to stand up, but his booted feet pulled themselves out from under him and he sprawled again.

He twisted into a sitting position

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and his light revealed a ropey red vine looped around his ankles. It was dragging him along on his bottom toward a small flat cluster of leaves six feet away.

So this was one of the dangerous vegetables of Flandna! Olivine grinned tightly as he got the sonic knife out of the pack. This plant was going to find itself prey rather than preyer!

He reached forward and slashed at the tentacle. The knife blade skidded along the surface without making a scratch.

Alarmed, Olivine examined the knife. It was working properly, and the sonic edge ought to slice anything softer than granite with ease. He tried it on the loop of red again with no more result than before.

Frantic now, he began jerking with his legs, trying to kick himself free before the plant could pull him into its maw or whatever. But he could do nothing. He was dragged up beside the leafy clump, and held there.

Rigid with terror, he waited for whatever was to happen next.

The plant had a dead-animal stench which Olivine decided, with an hysterical giggle, was highly appropriate.

"Icy shouldn't have lied to me," he babbled at it. "She said I was the only carnivore, but you're a carnivore, too. Aren't you?"

The plant made no response.

"What are you waiting for!" Olivine stormed in terror.

But the plant seemed content to hold him.

Slowly, the man calmed. He took a deep breath and let it quaver out in jerks. Whatever the plant was going to do to him, it was in no hurry about it. It was giving him time to think about escape.

He looked again at his legs. The red tentacle was gripping tightly around his ankles, but outside his boots. If he could slide the boots off . . .

He tried. The tentacle was bearing down too tightly for that. The boots were pressed in snuggly around his ankles. He couldn't remove them.

For a split-second, he thought about amputating his legs just below the knee. The thought had no appeal at all.

He stared at the plant, and frowned. How did it mean to dispose of him? It hardly seemed big enough to have a man-sized maw somewhere under its leaves. It was no larger than a two-year-old peony bush. Unless the maw was underground . . .

Olivine laughed. Maybe the plant wasn't hungry right now, but *he* was. Why not try turning the tables?

He slashed off a leaf and stuffed it into his rationmaker. The plant jerked, and dragged him a couple of inches closer. Then it became quiet again. Olivine cut off another leaf. And another. The plant writhed and twisted, but it could

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not stop him. Within a minute, it was reduced to a tuft of stems, the red tentacle extending up and out from the center of the tuft to make a loop that slammed around alarmingly for a few moments after the man had completed harvesting its leaves. Then it flopped to the ground, but did not loosen its grip.

And Olivine saw where the dead-animal stench was coming from. A dead animal.

It was one of the rabbit-sized centauroids, previously hidden under the leaves, and well along the road to decay. Decomposition was not advanced so far, though, as to obscure the marking around its rear midsection where the plant's tentacle had circled it for however long the animal had taken to die.

The plant hadn't eaten it at all. It had merely left the body there . . . *to enrich the soil!*

"I'll be damned!" grunted Olivine in dismay. "Not food, but fertilizer!" What a way to end his career! But in any event, this meant the plant wasn't a carnivore, after all. Not strictly speaking.

He twisted as far from the putrid corpse as the tentacle would let him, and turned on the ration-maker. The organics of the leaves turned out to be about the same as those of the plant he had processed earlier. He stared at the readouts, trying to think of something appetizing to make, and decided he wasn't hungry after all. Not with that stinking animal a few feet away. He converted the polywater to normal H_2O, and drank the liquids. Then he dumped the dry nutrients.

"More fertilizer for you," he told the plant.

For a while then he just sat there, looking at the red tentacle. It took up slack in itself, he noticed, by making a large loose loop, tightly twisted together near the ends that disappeared into the ground and held his ankles.

He tried cutting the limber loop with his knife, but failed as before. This was sterner stuff than the leaves, not only proof against the gnawing teeth of trapped animals but against the ferocious bite of a manmade cutting tool as well.

A remarkable vegetable, that plant, he mused. Real handy with that tough tentacle, almost as if it knew what it was doing. The coil around his ankles tight and stiff as hell, and the same where the ends of the loop were twisted together. But the loop itself relaxed and floppy. As if the plant knew what part of the tentacle had work to do a nd what part could take it easy . . .

Olivine snorted in self-disgust. He was wasting time admiring the plant's intelligence when he should be trying to get away from it!

And if the plant had no use for the loose loop of tentacle right now, maybe he did! He had something more powerful than a sonic knife at his disposal.

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He picked up the loop, bent it double, and shoved the bend into the receiving compartment of his rationmaker. Then, holding the lid down as tightly as he could he turned on the rationmaker.

The plant went into frenzy. The effect was explosive in its violence and suddenness. The tentacle whipped about like the end of a high-voltage cable, slashing the ground and occasionally the man with a fury of blind blows.

Stunned, grimacing from the beating, Olivine crawled away, gripping the rationmaker for dear life. But he couldn't seem to escape the rain of blows even after he had tumbled half a dozen meters away.

Cursing, he counterattacked, stuffing more of the tentacle into the rationmaker. Through a fog of pain and wrath he realized that his ankles had been released as soon as he turned the device on, but he was accepting no surrender. He kept stuffing until there was nothing left to stuff. Then he slapped the lid shut and stared about wildly, in search of another enemy to attack.

Only when his light swept across the torn hole in the ground by the small animal's corpse did he realize how complete his victory had been. In its frenzy the plant had worked its roots free, and they had gone into the rationmaker, too.

Shivering, partly from reaction and partly from the growing chill of the night, Olivine jerked the tent from his pack, inflated it, crawled inside, and turned on the heater. After resting a moment, he undressed and treated the stinging welts raised by the lashing tentacle.

Warm but exhausted, he looked at the rationmaker, and decided he was too tired to fool with it. He laid down and napped for a while.

III

A light patter of rain roused him. He sat up and looked at his

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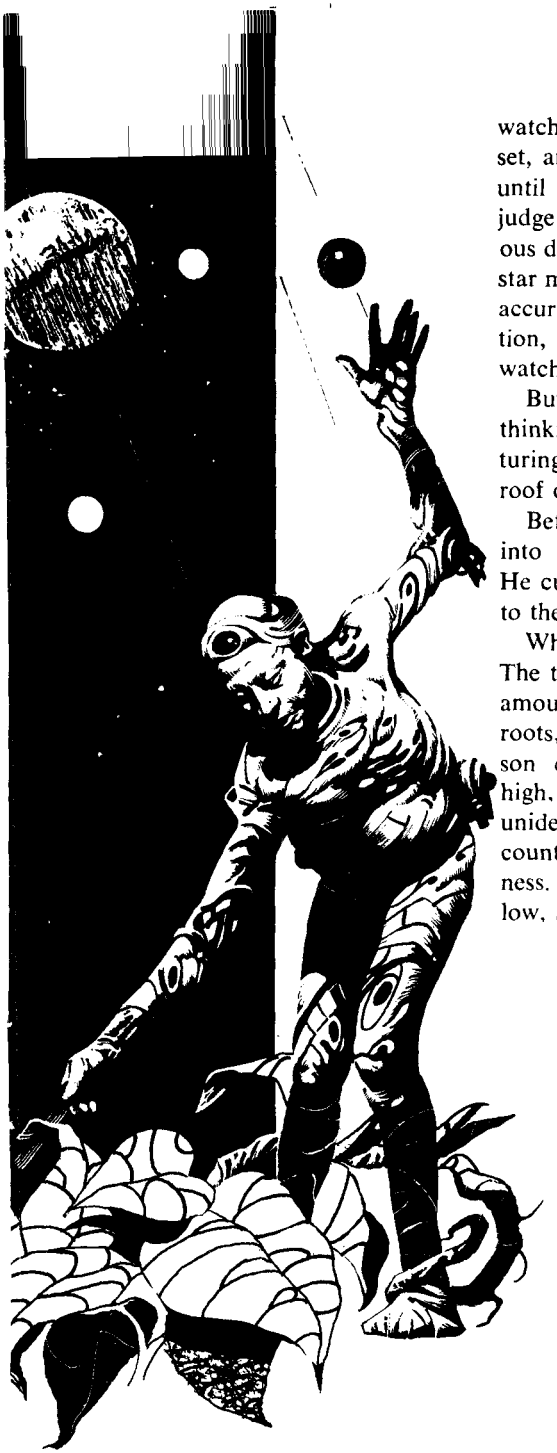

watch It was ten hours past sunset, and at a rough guess six hours until dawn, as near as he could judge from the length of the previous day. He would have to measure star motions, he told himself, for an accurate timing of Flandna's rotation, so he could recalibrate his watch accordingly.

But right now he ought to be thinking about some means of capturing the rain pattering on the roof of his tent . . .

Before he could get any plan into operation, the rain stopped. He cursed and turned his attention to the readouts on the rationmaker.

What he saw brought a grin. The tentacle plant had held a large amount of water, he guessed in the roots, and polywater also. The poison content had been extremely high, and he assumed it was these unidentified poisons which accounted for the tentacle's toughness. Usable food components were low, and that was O.K. because he

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was more thirsty than hungry at the moment.

He drank the normal water and decided to save the polywater for later. In fact, if he could find something to store it in, he might build up an emergency supply.

He opened the rationmaker's polywater compartment and peered in to estimate the bulk of its contents. The polywater, in a clear colloidal mass, looking like a sagging glob of gelatin slightly larger than a tennis ball, sat quivering in the center of the cubical space.

But it didn't stay there.

As soon as the compartment was open, a pseudopod of the stuff formed and reached up toward Olivine's face.

Startled the man jumped back. The pseudopod fell short and slopped down the side of the rationmaker and onto the tent floor. Rapidly the globule remaining in the compartment flowed into this lengthening ribbon until the whole mass was out.

While the wriggle of polywater resembled a plant tentacle only in form, that resemblance was enough to freeze Olivine for the moment it required for escape from the rationmaker. But now he realized he had nothing to fear from the stuff. It was, after all, pure H_20, differing from ordinary water only in that its molecules were strung together into supermolecules, which made it about half again as dense as ordinary water and about fifteen times as viscous. It was "plastic" water, so to speak . . . stuff that had been discovered back in the Twentieth Century and had a myriad of uses, principally as a lubricant since it remained stable and liquid from over 600 degrees Centigrade down to 40 below.

And so what if the stuff had suddenly formed into a tentacle shape and slid out of the rationmaker when he opened the lid? After all, there were dozens of mnemoplastics—stuff that tended to regain an earlier shape—on the market. Tangline was one of the best-known of these. Why not plastic water that was mnemonic?

The wriggle was now oozing across the tent floor—running downhill, Olivine told himself—like a thin, transparent snake. It was approaching the heater-cooler, which it could gum up, and Olivine was about to move the device out of the way when the polywater halted. It was motionless for a few seconds, and then began bending itself. It formed a loop with its front section, then lifted its remaining length, in a series of 180-degree bends, to form a grid standing vertically over the loop base.

The grid was directly in the path of the flow of warm air from the heater. The polywater was warming itself!

Olivine stared in surprise, then shrugged. "O.K., stuff, you're alive, I've got a flexible mind. Nobody

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ever heard of living polywater before, though. And I can't figure out how you work."

He bent down to peer closely at the highest segment of the grid the wriggle had formed, looking for internal structure. There ought to be a gut, or a nerve ganglia, or a sense organ, or something. But he could see nothing but clear colloid. Not even a speck of lint picked up from the tent floor.

Olivine sat back, thinking hard. Slowly, he began to reach some tentative conclusions.

What he had here, evidently, was about the simplest life form imaginable—pure water so structured molecularly as to function volitionally. And its life process was probably equally simple, such as soaking up heat, as it was doing now, to be expended in maintaining its form and in moving itself about. And also, he guessed, for whatever amount of thinking it might be capable of.

Heat could create free electrons within the polywater, and speed their motion . . . in short, could produce tiny electrical flows in the molecular lattice. So the creature must think electrically, and sense the same way. What it could learn about its environment in that manner . . . well, that would take some experimenting to find out.

For a while Olivine mulled over the fact that the creature's surface had to be a one-atom-thick layer of hydrogen, but that didn't lead him to any informative conclusions, so he gave up on it.

The practical consideration was that he, by chance, had discovered a new life form of a startlingly basic type. Something not even the Space Patrol nor the CIT computer knew about. He had happened to be marooned on this particular planet with a new type of rationmaker that let polywater come through the analysis process *as* polywater. Certainly the CIT computer couldn't predict something it didn't know existed!

So, he thought with grim satisfaction, when the doodle leaped out of the rationmaker at him, an unknown factor entered the equation of former Proxad Omar Olivine. All he had to do was find a way to bring that factor into play . . .

Rescue came at dawn four days later.

Olivine came out of his tent as usual, then froze at the sight of a Patrol pick-up bug standing not a dozen meters away.

"Good morning, Ollie," came a voice from the bug's exterior speaker. "I trust you slept well."

Olivine nodded dumbly, trying to tell himself this was what he had been hoping for. But capture was hard to accept emotionally, desirable though he knew it to be.

"That you, Coralon?" he asked, thinking the voice sounded familiar.

"Right, old buddy. I happened to

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be passing close when HQ got the word you were stranded here, and I was sidetracked to give you chauffeur service, back to you-know-where. Are we going to do it the easy way?"

For a moment Olivine hesitated, eying the bug's gunsnouts that were capable of blasting him to bloodbutter, stunning him, or tanglining him, depending on which button Proxad Dayn Coralon chose to push in the control room of his ship hovering out in space.

Olivine shrugged. "I'll go quietly just this once, Danny, as a personal favor to an old pal."

"Good boy!" Coralon's voice approved.

"What about my stuff?" asked Olivine, looking toward the tent. "Shall I just leave it?"

"No. Better not. It's stolen property, so we'd better bring it along. Pack up."

Olivine deflated the tent and began stuffing it and the other equipment into the pack.

"How did HQ find out about me?" he asked as he worked.

"A call one of our scouts monitored at the edge of the Roost area," Coralon replied. "It seemed that your partners in crime on the *Glumers Jo* wanted to get past the Rooster pickets without being shot at. They were trying to explain how a con man and a no-talent doll could grab a port-service ship and get away with it. They had to explain about you, including how they had dumped you on Flandna. Perhaps the Roosters would have got around to picking you up. The Patrol decided to beat them to you, so here we are."

That last, Olivine realized, was meant as a light goad, inviting him to try to make a break for cover in expectation of later rescue by the Roosters. He was having none of that! Despite the "old buddy" talk of Proxad Coralon, Olivine knew that his one-time classmate at the Space Academy would relish an excuse to butter him. After all, to goody-goods like Dayn Coralon, Olivine was that lowest of criminals, the turncoat crooked cop.

"So Holbein and Icy made it to the Roost," he remarked.

"Yep, they managed to slip past us," replied Coralon.

Olivine grimaced. Slip past, hell! The Patrol had wanted the *Glumers Jo* to reach Dusty Roost all along. That was the finishing touch on the Douthit Three super-pot play.

As for whether the Patrol had meant for Olivine to reach the Roost as well was another question. He guessed not. Having served the Patrol's purpose, and not being a harmless small-timer like Holbein or Icy, the starfuzz had probably intended to get him safely back into prison.

Which meant that his move, in putting Icy in command of the *Glumers Jo,* had been anticipated

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like everything else he had done!

But no more of that. Not if he could hang onto his polywater doodle.

Savagely he snarled, "That damned CIT knew I'd wind up here all along! It could have sent one of you slave-boys to pick me up long before this!"

"Sorry to have kept you waiting, Ollie," Coralon chortled. "Maybe you're right. And maybe the CIT held off until Icy Lingrad's call was monitored, just so you couldn't be *sure* you're right. Who can plumb the subtleties of a heavy compucortex, hah?"

Olivine snorted a curse. "Just watch your step, old pal. Don't get out of line, and don't ever consider yourself a free man. Just toe the Patrol's mark like the pliant little saint you're supposed to be, and maybe you'll never learn what a total slave you are to that computer!"

Coralon laughed. "Thanks for the warning. Now hurry it up a bit will you, old chum? I have other duties to get on with. Isn't everything packed?"

"Yeah. I'm ready to go," said Olivine.

"What's that tube sashed over your shoulder?"

"Two meters of syphon tube full of polywater I've saved."

"Got a stuffy tummy, hah?"

Olivine glowered. "No, but I probably will have in the Patrol's oh-so-humane dungeons. It was my emergency water supply."

"O.K., bring it along. The tube's stolen property, and we can dump the poly into my ship's auxlube tank. Get aboard the bug."

Olivine picked up the pack and approached the bug with a sarcastic grin. "Ten cents worth of tube and maybe fifty cents worth of polywater to confiscate in the name of the Patrol. I'd forgotten what big-time operators proxads were!" he sneered.

"As I said, the tube's stolen property, old pal," Coralon replied coldly. "If you want to keep the poly for bellyflush, I'll give you a tube to keep it in."

"Such magnanimity!" snorted Olivine. He stowed the pack in the bug, then climbed in himself. "I'm aboard."

"O.K.," came Coralon's voice. "Port closing."

The door swung into place and locked firmly against its seals. Olivine settled back in his seat, readying himself for lift-off.

What he felt instead was a needle penetrating his rump. He remained conscious just long enough to realize he had been slipped a knockout.

IV

Coralon was talking to somebody . . . somebody with a younger man's voice, perhaps a Patrol cadet in training.

". . . Before we deliver him," the proxad was saying as the words became meaningful through

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the lifting fog of unconsciousness. "So keep an extremely tight lip, Greg. Leave the questioning to the experts who'll debrief him under high-sensitivity microdar monitors. He's a clever chunk of slime, and don't forget it. He might learn more from our questions than we would from his answers. Besides, he has no information we need."

Olivine was lying not quite flat on his belly, with his mouth hanging open and drooling slightly. He resented the disgusting appearance this was giving him, but he resisted the impulse to stop the drool. If Coralon thought he was still out like a light . . .

"O.K., sir," the younger man said "I assumed we would do a routine interrogation, but if HQ says no . . ."

"That's the order," said Coralon firmly. "And after all, this guy's not going to be going anywhere for a long, long time. The experts can pump him as dry as they like."

Olivine remained motionless, listening for more talk, but the two men of the Patrol were silent. Well, that had been a forlorn hope, anyway. Coralon was no idiot to say something revealing in the presence of a presumably unconscious prisoner.

More informative than words to Olivine's ears were the sounds of the ship around him. To his sharp, experienced hearing, those sounds told a great deal.

He was not in a regulation twenty-meter proxad's cruiser, but in one of the giant utility tank ships the Patrol used often as heavy freighters and occasionally as paddy wagons. And why was a top-gun proxad like Coralon jockeying a freighter-paddy wagon?

Surely not merely to pick up a stranded escapee.

No, Coralon's presence aboard a utility tanker had to mean some very important freight was aboard. And the bypassing of the interrogation routine, for fear of disclosing some secret to Olivine in the process . . . maybe a careless word that would enable him to guess what that cargo was—

But what good would knowledge of the cargo do a man in his position? Surely the Patrol didn't think he could grab something as bulky as the load carried by a utility tanker! Nor could he override this ship's compucortex—not with Coralon around, certainly—and make off with freighter as well as freight.

Unless . . .

He couldn't avoid a telltale twitch when the answer hit him. He instantly added a soft snort and gulp to it, then became tensely motionless. Coralon would know he was awake now and playing possum. If the proxad was supposed to bait him with some data, now was the time he would do it. He waited.

All the proxad said was, "Quit kidding. I know you're awake."

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Olivine sat up and gazed around dully. He was sitting naked on a cot inside the barred cubicle against the inboard bulkhead of the auxiliary control lounge . . . just where he had judged himself to be. On the foot of the cot was an outfit of regulation prison garb, and a plastic tube full of polywater.

With inward relief and outward indifference he tossed the tube out of the way and began dressing. "It wasn't reg to make me sit on a mickey needle," he complained.

"It was in this case," replied Coralon, who was seated out in the lounge with his younger partner drinking coffee. "That knockout was specifically ordered. We want you back in your proper box without further ado, old pal, and you know our prisoner-handling routines too well for us to take chances. Quit griping, chum. The extra nap didn't hurt you."

"I said I would come quietly," Olivine groused.

Coralon chuckled, "And you kept your word, too. You were as quiet as a mouse."

Olivine snorted. For a moment he stared around, giving a long look at the viewscreen, which was unobligingly blank. "We're on course for Sarfyne Four, I take it," he said.

"That's your destination, old buddy," Coralon responded evasively.

Olivine stared at him, then shrugged. "To hell with you," he said tiredly. "Do I get breakfast before the inquisition?"

"Ship, give the prisoner breakfast," Coralon directed.

"Yes, sir," replied the utility tanker. A deck panel opened by the cot and a serving pedestal rose, carrying a steaming plate of amegg along with fruit juice, coffee and toast. The prisoner fell to with a good appetite.

"I've instructed the ship, which is the *Barnaby*, by the way, to give you food, water, and toilet facilities as you request, without the O.K. of myself or Mr. Brantee," said Coralon. "Anything else you need will require my approval."

"So the young sucker's name is Brantee, huh?" said Olivine around a mouthful of food. He gazed at the young man. "Another victim of the Patrol's snow job, all eager and dedicated to upholding the Confederal standards of piety, privilege, and status quo." He sneered. "There, without the grace of God, went I when I was equally young and gullible. I wised up fast, but not fast enough."

Brantee smiled easily. "You wouldn't try to subvert me, would you, Mr. Olivine?"

"Not much point in that," the prisoner replied. "You're already in, and there's no turning back, boy. You've had it."

Brantee laughed.

"You see, Greg," Coralon said to his partner, "my old pal Ollie

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has more than a touch of megalomania. That's why he entered the Patrol in the first place. The thought of being a proxad—a proxy admiral—appealed to his delusions of grandeur. He didn't get the message that, in the Patrol, responsiblity has to accompany power. Probably because he doesn't know the meaning of the word 'responsibility'. His idea of being a proxad was to land on whatever Confederal world to which he was sent, make free with his choice of the colonists' wine and women, line his pockets with a bit of bribery or plain thievery, and then—at his leisure—deal with the local crime problem he had been assigned. Hell, by that time, old Ollie would be a bigger crime problem than the one he was supposed to handle!" The proxad chuckled reminiscently.

"I can't see how he would get away with that for five minutes!" said Brantee, sounding appalled.

"Because he was clever," shrugged Coralon, "and because of the glamour of the Patrol and that pretty-boy pan of his. Women have always tended to spoil him rotten, anyway."

"Spoken like a jealous man," growled Olivine, who was not appreciating being psychoanalyzed. "You and that pitiful mud-pie face of yours. They tell me, Coralon, that even the streetwalkers of Novmadder charge you double."

The proxad grinned. "My sex life is quite satisfactory for a *normal* man, chum."

"But how did he make proxad in the first place?" young Brantee persisted. "Surely the CIT computer's analysis would show up his personality flaw!"

"He made it because he's got ability," said Coralon. "The Patrol hated to pass up a guy with so much on the ball, and hoped appropriate mental therapy and training would get him out of that obsession of his. It didn't work out," he finished sadly.

"Damned right it didn't work," snapped Olivine, "and I'll tell you why! Because I'm *not* a psychotic, with megalomania or anything else! What I've got is the perfectly natural human drive for supremacy. That's a drive our artificial society with its precious Patrol suppresses, because it rocks the boat. But being taboo doesn't make it any less natural. Look at the most peaceable animals! Look at cattle, for instance, meekly nibbling grass. Every herd has its boss bull, who fought for and won supremacy.

"Most guys are like you two. They let their drives be suppressed. But not me. I'm a healthy-minded male human, doing the best I can to fullfill myself."

"And fortunately for everyone else," said Coralon, "you're failing."

"I'm playing against a thoroughly stacked deck," Olivine retorted. "That stinking computer.

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Any society has to be sick to make a computer its top dog."

"More responsibility can be built into a computer than any man, or group of men, can possess," said Coralon.

"Responsibility!" snorted Olivine. "That word's your all-purpose pat answer! Look, you jerks, let's get on with the inquisition, after which I'd appreciate some privacy."

"No questioning this trip," replied Coralon, standing up. "That will be taken care of on Sarfyne Four. Let's go, Greg."

"What do you mean, no questioning?" Olivine demanded. "Maybe you can pick my brain for something that'll help in recapturing old mealy-mouth Holbein and that Lingrad!"

Coralon grinned. "They're no friends of yours, now that they've dumped you, hah? Well, don't fret, pal. They'll get theirs if they ever set foot out of the Roost."

"Ah, the mighty Patrol!" Olivine sneered angrily. "A guy like me you hound bravely across half the galaxy, but when it comes to dealing with two dozen entire planets full of pirates and smugglers, your bright blue uniforms take on a yellowish glow."

Coralon's face hardened. "The Roost," he said coldly, "doesn't lend itself to quick, easy solutions. Our policy of containment may not be ideal, but it's better than the full-scale war it would take to clean out the Roost."

"Yeah, anything to avoid a fight . . . with an enemy who might have teeth!" Olivine snapped back. "Coralon, you poor sap, those grandmotherly types back on Earth who dictate Patrol policy are making cowardly hypocrites out of the lot of you! How do you hold your head up in public?"

"Come on, Greg, we have work to do," growled the proxad. He stalked out of the lounge, followed by the trainee.

Olivine chuckled, realizing he had got under Coralon's skin. The Roost *was* a touchy subject with the tougher-thinking proxads, such as Coralon. It galled them to be told to lay off the Roost, to leave that sanctuary for criminals strictly alone, and merely try to blockade traffic in and out. They realized all too well that a policy of containment couldn't work for a sector of the galaxy some forty cubic parsecs in volume.

Left alone, Olivine sat on the edge of his cot and studied his prison cage, not deterred by the certainty that the ship *Barnaby* was observing and taping his every action. Why try to hide his interest in escaping, when that interest would be presumed, anyway?

Not that he expected to spot any weakness—the control lounge cages of utility tankers were constructed to be *secure*, and this one was. The Patrol had screamed with agony when legal decisions had

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forced it to provide such cages as this, to be used when a single prisoner was being transported, to avoid what amounted to solitary confinement of a lone miscreant in some lower-deck dungeon. The fact that Coralon had placed Olivine in the cage indicated that the utility tanker's lockup deck was uninhabited. In all likelihood, Coralon, Brantee, and Olivine were the only people aboard.

But even if the two Patrolmen were preoccupied elsewhere in the ship, and if Olivine could manage to get out of his cage, the ex-proxad realized something more—much more—would be necessary for a successful escape.

Barnaby had to be neutralized, or at least thoroughly distracted. Otherwise, the ship would simply hit him with a glob of tangline and leave him trussed up, maybe in a bone-breaking position, until one of the Patrolmen got around to untying him and putting him back in the cage.

And a compucortex of *Barnaby*'s caliber was not easy to trick or disable. There was no chance of overriding *Barnaby*, already under Coralon's firm command, as he had overridden the *Glumers Jo*, which had a lower-capacity compucortex and which he had found in an unmanned condition. And it would take an awful lot of distraction to occupy *Barnaby*'s attention circuits to a point where the ship would ignore the prisoner's actions.

Olivine frowned. He was not ready to admit that he was stumped, but he could certainly see no easy solution.

And his guess about the *Barnaby*'s principal cargo—a guess he was sure was accurate—made him want out very badly.

That cargo, nestled down in the main hold, had to be a *ship*. And no ordinary ship. While it was small compared to the utility tanker that was transporting it, or even compared to the *Glumers Jo*, it *had* to be very special to get the kind of handling it was receiving. It had to be a fighting ship of the Patrol, and more.

What excuse was there for one spaceship to haul another in its hold?

Answer: The ship being hauled was not ready to travel on its own.

And when couldn't a ship travel on its own?

Answer: When it hadn't been *mastered!*

And why wouldn't the master-to-be come to the ship instead of the ship being brought to him?

Answer. The master-to-be was too busy to make the trip, and officially considered such by the Patrol high brass.

Was a proxad ever *that* busy?

Answer. No, but a *vizad* might be!

Conclusion: The *Barnaby*'s cargo was a vizad's command cruiser, in an unmastered status.

It was enough to make Olivine's mouth water.

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What other cargo than a ship—a cargo that was its own transportation—could he hope to grab, and thus make Coralon ultra-cautious in his words with the prisoner so that the prisoner would never learn of the cargo?

Olivine grinned wolfishly. To an intelligent man, a conspiracy of silence could be as informative at times as words.

But knowing the vizad's cruiser was waiting, just a few decks away, wasn't getting him to it. He stood up and prowled his cage in agitation.

The answer, if there was an answer, had to lie in the polywater doodle. The doodle was the new factor in the equation, the thing unknown to the Patrol, to Coralon, and to *Barnaby*. Of that he was quite sure.

Before being rescued from Flandna, Olivine had used his time well, running dozens of tests on the little colloid creature. As a result, he had a pretty good understanding of its nature, its habits, and its potentials.

It had been, without doubt, the "brains" of the tentacle plant that had tried to use him for fertilizer. Not a brilliant brain, by any means, but one capable of keeping its plant form well nourished and watered in a highly unfavorable environment.

Nature had never intended it to survive—like a disembodied soul—the plant in which it had grown. In the ordinary course of events, when disaster hit that plant, its polywater content would have soaked into and been dispersed by the dry soil of Flandna. That would have been death, and highly undesired, as Olivine had learned from the gingerly way in which the doodle had jerked back from contact with the ground. After that, the man had offered the doodle a length of syphon tube as a substitute body, and the doodle had taken to it immediately.

The habit pattern it had followed in plant form had modified, proving the doodle had sense enough to be adaptable. Not once had it attacked the man. But parts of the pattern remained stable, since they still served the doodle's needs.

For instance, it was seldom active when in warm surroundings. Activity during the heat of the Flandnan day would have been useless, since fertilizer-on-the-hoof stirred about only at night. Only when the temperature began dropping did the doodle "wake up". That was why Olivine was confident the secret of the doodle had not been learned by the Patrolmen while he was unconscious from the mickey needle shot. The doodle had been as warm as it wanted to be itself and thus in no need of seeking heat, the inside of the pick-up bug had been warm, as was the inside of the *Barnaby*.

So Coralon could squeeze the doodle out of its syphon tube,

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analyze it, and suck it into the tube which now lay on Olivine's cot without seeing an indication that it was other than ordinary polywater. Because that's what the doodle acted like in its "sleeping" stage.

But when "awake" the doodle was something else! It could—to a degree—*learn*. It could be taught tricks. It could follow an order.

It could do these things by duplicating motions Olivine put it through a few times, with warmth as a reward. It did not understand spoken language, or any code of tappings the man could devise, but it did understand shapes, motions, positions, and objects.

It could bend itself into the outline of a pair of spectacles—a joined O.O. for "Omar Olivine". It could follow an obstacle course, after having been dragged through the appropriate motions, to reach a container of hot water. It could climb up Olivine's body and out one of his extended arms for a similar reward held in his hand.

Also, it could creep under Olivine's blanket to huddle curled against his warm stomach, as it did one night after straying outside the tent while he slept. This Olivine had not encouraged, because the creature had returned several degrees colder than ice, and its touch had scared him witless for a minute, in addition to being painful.

But now, aboard the *Barnaby*, the question was how could he make use of the doodle's abilities?

There were possibilities . . . one of which was the opening of the bulkhead door in the back of his cage, which would give the prisoner the run of the ship for the very few seconds it would take *Barnaby* to tangline him. Another, perhaps impossibly complicated, would be the shorting by the doodle's body of a couple of *Barnaby*'s key circuits. The obstacle course the doodle would have to run to reach those circuits was long and involved. Olivine was not sure his own memory of utility tanker construction was accurate enough for him to train the doodle properly, or if the doodle could retain that much instruction, or that the path to be followed would not pass close enough to a heat source to end the doodle's mission prematurely.

But there was a problem that came before any of those. Training the doodle for anything at all required actions on his part that could hardly be disguised. If he started putting that tube of polywater through a series of senseless motions, how would he explain his actions to *Barnaby* and the Patrolmen? That he was practicing an obscure Plaxadalican snake dance? That he had suddenly gone batty?

Olivine knew all too well that no such explanations would be bought. Not by a guy like Coralon, who had been around enough to be surprised at nothing and suspicious of everything.

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The prisoner flopped on his bunk face down, his head resting on his forearms, to conceal the snarl of angry frustration that was twisting his handsome features.

V

Five ship-mornings later young Brantee entered the lounge alone, distractedly asked the prisoner how he was faring, and ordered a mug of coffee from the ship. His mind seemed a thousand parsecs away as he sat sipping and gazing at nothing.

Olivine studied him. This was a departure from the norm. Coralon sometimes came into the lounge alone, but not Brantee. And at this time of day they usually came in together. Neither of them spent much time there—just enough to satisfy the letter of the no-solitary edict.

"What's up?" Olivine asked.

Brantee gave him a resentful glance. "Nothing's up. Have some coffee, Olivine."

"Don't try to kid a kidder, punk," snapped the prisoner. "I know buck fever when I see it, and you've got it, boy! Now, what's going on?"

"What's buck fever?" the Patrol trainee asked.

"Nervousness before a fight. It comes from knowing the chips will be down, pretty damn quick, and from not knowing how much yellow you're going to show. It's worst in squirts like you who haven't been in many fights. Now, let's have the news, kid."

Brantee stirred restlessly. "There's nothing to tell."

"Where's Coralon?"

"Busy. He said to tell you he'll drop by a little later."

Olivine grimaced. The kid was plainly under orders to keep his mouth shut. But a kid can be tricked . . .

"O.K, I see I'm not going to get anything out of you," the prisoner said. "But let's get something straight, boy. I value my skin a lot more than I do your company. So with the ship as witness, I hereby excuse you from baby-sitting me if there's some kind of emergency that needs your attention."

Brantee put down his mug and leaped to his feet. "Thanks, Olivine!" he snapped over his shoulder as he hurried toward the door. Then he halted suddenly, turned and walked slowly back. "There's no . . ." he began, then shut up when he saw the grin of triumph on Olivine's face.

The Patrol trainee whirled and stomped out of the lounge cursing.

"Tell Coralon I got a right to know what's up!" Olivine squalled after him.

Alone, he paced his cage, his mind working furiously. What was happening ? The kid hadn't been faking; no kid could put on that convincing an act. The *Barnaby*

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was heading for trouble . . . no question about it.

But what kind of trouble?

Five days out from Flandna . . . Mentally, Olivine constructed a globe of space, with Flandna at its center and with a radius roughly equivalent to the distance five days of normal drive would cover.

The globe intersected . . . well, it intersected plenty of places where a starfuzz ship might not be completely welcome, but only one really dangerous zone: the edge of the Dusty Roost pirate enclave!

And come to think about it, where else but in the Patrol's thin cordon around the Roost would a new vizad—field-promoted from proxad—be waiting for an unmastered command cruiser to be shipped out from HQ?

It all fitted together. The *Barnaby* was supposed to deliver the cruiser before taking Olivine on to the Sarfyne Four prison world. But right now, approaching its first destination, it was on the verge of encountering more Roosters than Patrol ships!

But it could be highly deadly. A Patrol ship had never yet been allowed to fall into Rooster hands. If the *Barnaby* could fight its way through whatever assault the pirates might be mounting, or if reinforcements rallied in time, all would be well. But if the utility tanker were about to fall into enemy hands, *Barnaby* would self-destruct with a violence that would leave nothing but a rapidly dispersing smell of metal in space.

Olivine cursed and grabbed at the bars of his cage. *"Coralon!"* he bellowed. "Ship, tell Coralon to tell me what's going on out there!"

"Your message will be delivered, sir," *Barnaby* replied.

"Right now!" he snarled.

Half a minute passed before the proxad's voice came over the speaker. "What's happening is none of your business, Ollie!" he snapped hurriedly. "Now shut up and don't pester me, or the ship! Order anything you want immediately, because I'm instructing the ship to ignore you starting in one minute. Out!"

"W-wait a second!" Olivine yapped in terror. "You can't leave me trapped here like a rat . . ."

But the proxad was obviously no longer listening.

"If you require food, drink . . ." began *Barnaby*.

"Oh . . . oh, yeah! Gimme a bourbon on the rocks, Ship!" Olivine directed, getting a grip on himself. "Make that *three* bourbons on the rocks so I'll not need to ask for more!"

"Very well, sir."

The serving pedestal rose, carrying the three ice-filled glasses. As Olivine had learned earlier, the ship served him no booze, but tried to be accommodating. Thus, an order for bourbon on the rocks brought ice and nothing more. He removed

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the glasses from the pedestal and placed them on the floor.

Then he waited, counting seconds and wondering just how literally *Barnaby* would take Coralon's instructions to ignore him. Or if the proxad would realize how sweeping that instruction was, and would modify it. Because if the ship ignored him *completely* . . .

He judged a minute had passed. "Damn it, *Barnaby*, at a time like this you could've given me some booze," he complained. "*Barnaby*? . . . Answer me, you misconnected idiot!"

No response.

It was now or never.

He grabbed the tube-encased doodle, coiled it into a tight spiral on the floor, and hurriedly dumped the ice from the three glasses over it, spreading the lumps out to cool the creature into wakefulness as rapidly as possible. He tried not to let himself get in a stew as he watched for the doodle to begin moving. The *Barnaby* was well-armed and strongly shielded, he reminded himself. It would be no quick and easy pushover for a whole squad of Rooster raiders. And so far as he could tell, the battle hadn't even been joined yet.

At that instant the ship lurched and a dull *Thunk*! jarred through it.

Olivine jittered. A near miss! The attack was beginning!

The doodle finally stirred. The man felt of it, judged it to be chilled enough to remain awake for the job at hand, laid it out in a straight line on the floor, and hurriedly began putting it through its training program.

He shoved a tip of the tube under his left shoe, in the space between the arch and the floor, and wriggled it through.

"You'll have to flatten to get through that crack," he muttered at it, "but the door's not sealed, so you can make it. Then, as you come through, thicken out again, and climb straight up, like this . . ." He guided the doodle up the side of his shoe and then his trouser leg, standing up gradually as he did so. "Then when you get this high, start feeling around for a hole . . ." He swung the tip of the tube back and forth in a search pattern, ending at a corner of his pocket which he was pinching to a small hole with his other hand. "When you find it, just crawl in, like this . . . and your conductivity will do the rest, and your old pal will come put you back in your tube and find a warm place for you."

With that he wadded the tube and cupped it in his hands for a moment, long enough for the doodle to feel warmth without gaining much increase in temperature.

Then he went through the whole routine again.

For so critical a job he would have liked to have spent half an hour putting the doodle through its

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paces, but there wasn't time. The *Barnaby* was lurching and thunking continually now, and the battle would *have* to end, one way or another, within a very short while.

He went to the bulkhead door, unsealed the end of the doodle's tube, and ran the tube between his thumb and forefinger from the other end to squeeze the creature out onto the floor. Being careful not to tear its colloidal substance apart, and have to take time to let the doodle pull together again, he pushed its tip against the thin crack at the bottom of the door. "Slurp through, damn you!" he hissed.

Slowly, the doodle began disappearing. Olivine sighed with satisfaction. So far, so good. He wished the doodle could hurry it up, but it had to go membrane-thin to get under that door, and a membrane made a low-volume flow. He would have to be patient.

He muttered, half-sentimentally: "If I didn't have you to count on, little trickle, I'd be out of my skull by now!" At least the doodle was giving him something to do other than pace helplessly while waiting for the air to *whoosh* away, or for the ship to self-destruct, or for the pirates to be defeated so that he could be carted on to prison.

The doodle was, however, as unmindful of Olivine's words as it was of his hard-pressed mental stability. Its one concern was to regain a desired state of warmth, and it had received inputs to guide it to that goal. It continued to flatten its substance and ooze through the crack . . . between the warm floor and the warm door. Membrane thin during the passage, it soaked in the heat from the surrounding metal. When all of it was beyond the door, it felt quite comfortable, except for its lack of a containing husk and that was no urgent need. As it had achieved its goal, it promptly forgot the remainder of the input and relaxed on the floor.

"Good work!" whispered Olivine as the last of the doodle vanished under the door. "Now hurry up and foul that lock circuit "

Wham!

"Ugg!" he grunted in dismay. The ship had been hit! He held his breath against an impulse to whimper, but wherever the hit had been the ship was handling the emergency O.K. The air pressure had remained steady. "Hurry, doodle! Please hurry!" he begged.

Ker-WHANG!

This time the lounge lights flared brilliantly for a split second, then dimmed, and Olivine could hear the faint *click-click-click* of power adjustors going into action. The door, against which he had been pressing his hand, suddenly gave way, and he half fell into the passageway beyond the bulkhead.

Free! But with no time to waste.

Quickly he slurped the doodle into its tube and stuffed it in a pocket, not stopping to wonder

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how the creature had got to the floor so promptly after fouling the lock. He dashed for the aft-tube, slid down to the main hold, swung nimbly out onto the deck, and skidded to a quick halt.

For an instant he gazed in awed delight at the sturdy, forty-meter tapered cylinder of gleaming silver held erect in the *Barnaby's* belly cradle.

It was indeed a vizad's command cruiser!

He scampered up the ramp to its main lock. The seal, he saw, was still in place, evidencing the cruiser was unmastered and untampered with in transit. With a quick jerk he ripped off the seal and spoke:

"Ship, I'm your vizad! Open up!"

The lock opened and he jumped inside. "Close the lock and instruct the *Barnaby* to unload you immediately! The *Barnaby* is under attack! Use whatever emergency procedures are necessary to get us into action without delay!"

"Yes, Vizad. Welcome aboard," replied the cruiser.

Olivine could hear clangings dimly through the hull as he scurried up to the command deck. He hoped the *Barnaby* wasn't giving the cruiser an argument about the unloading. The Patrol's ships, as well as its men, had orders of rank, and a command cruiser was several steps above a utility tanker.

Indeed, the cruiser was out in space by the time he reached the battle console and studied the situation revealed by the viewscreens.

The attacking Rooster squad was composed of three giant warships—slugburgs—served by at least two dozen twelve-meter minimans—tiny one-man ships which were, at the moment, carrying the brunt of the assault while the slugburgs held position outside effective range of the *Barnaby's* weaponry.

It was a typical gauntlet pattern of attack, used by the pirates when a victim's best hope was to run for her protective destination with minimal evasive maneuvering. The pirates were strung out in front of the *Barnaby*, with the three slugburg biggies holding their distance while the minimans drifted back, singly and in clusters, to take passing slaps at the utility tanker.

Even six or eight at a time, the little attackers could not blast the *Barnaby* out of action. That wasn't their job. They could wear the Patrol ship down, however, by inflicting small but incremental damages, without risking heavy pirate personnel and tonnage losses in the process. When they had the victim weak and groggy enough, then the biggies would move in for the kill.

Olivine knew what he had to do, and he didn't particularly mind doing it. Loyalty among thieves, he had always thought, was a highly nonsensical concept, anyway. In any event, until his mastery of the

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command cruiser was accepted beyond question, he had to act like a Patrolman, and act it to the hilt.

"Parallel the *Barnaby* at two hundred kilometers," he snapped, "and slash-laze the attacking minimans! Gimme manual on your hardest forward laze and I'll keep the biggies busy!"

The cruiser's laser offensive flared into action, and the beams, guided by the most brilliant compucortex mountable in a ship, did not miss. One after another the minimans were gashed—often sliced completely through—and simply vanished from the scene of battle as they lost warpage and teetered into normspace, to be instantly left far behind.

But the three biggies were too distant, and their screens too effective, for Olivine to do them real harm with the beam.

The cruiser reported: "Seven minimans destroyed, sir, and the others attempting to disengage."

"Stay after them!" ordered Olivine. "The biggies are pulling back, too. Let's bark at their heels! Cut into any of them you can reach!"

"Yes, sir. Reinforcements will arrive in eighteen minutes, and the *Barnaby* is calling, sir."

"O.K. I'll brief you fully when we have a moment, Ship, but you'd better know now that I'm operating under a cover the *Barnaby* crew doesn't know about. So act on no instruction Proxad Coralon may try to give you. Put him on."

The proxad's enraged face flashed on the viewscreen.

"Olivine!" he bellowed. "Get back here with that cruiser or I'll blast you to nebulosity!"

"With the popguns that old scow carries?" leered Olivine. "Don't fantasize, old pal!"

Coralon glared. "Command cruiser 749JN-10, you have been seized by an enemy of the Patrol, an escaped prisoner! Restrict him immediately and return to the hold of the *Barnaby*!"

"My regrets, Proxad Coralon," responded the cruiser, "but your instructions cannot be accepted."

Coralon's look of utter dismay brought a roar of laughter from Olivine. "You've had it, pal!" he gloated. "I'd love to watch you explain at HQ how the hottest ship in space was swiped from the Patrol! I see you in civvies in less than a month, pal. Or they may throw the book at you and give you my cell on Sarfyne Four!"

"You heard him, Cruiser!" the proxad yelped. "You heard him *admit* stealing you! Now return to the *Barnaby*!"

"I cannot comply, Proxad Coralon," said the cruiser.

"Wise up, pal," snickered Olivine. "You know mastery can't be overridden like that! And I'm *master* of this beautiful boat!"

Coralon's shoulders drooped. He knew well enough that, for a Patrol ship of the line, mastery was a total, instant, unquestionable bond.

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It had to be that way. A Patrolman's ship had to be loyal beyond all doubt, and nothing short of death, disavowal, or thorough reconditioning could break that loyally.

"Your time will come, Ollie," the proxad promised grimly.

"Don't hold your breath in the meantime," Olivine chuckled. "Break comm, Ship."

Coralon's face vanished to be replaced with a view of the battle situation. The battle, however, was over.

"Where did the biggies get to?" Olivine demanded.

"Their retreat carried them into concealment in the Veil, sir. Shall we continue pursuit?"

"Yeah. We need concealment, too, from the *Barnaby* and those Patrol reinforcements. Move into the Veil, cut down to a safe speed, and keep going. Don't chase any biggies, though, if you happen to detect them in that soup. Let 'em be."

"Very well, sir."

The Veil, the starlit rind of the vast cloud of gas and dust that lay like a barrier between Dusty Roost and the rest of the galaxy, glowed dimly ahead. Suddenly they were in it. Olivine watched as the green dot representing the *Barnaby* slowly faded from the rear screen as the Veil substance blanked out detection. More slowly, the stars of the galaxy faded from sight.

He stood up and stretched luxuriously, feeling a contentment he had seldom experienced. He had succeeded, after years of frustration, to an extent beyond his wildest dreams.

A command cruiser!

The hardest, fastest, fightingest ship ever built! Probably no more than a dozen of them in the universe, and his, being the newest, was doubtless the best.

A ship like this meant power for its master. Power limited only by the master's desire and ability. And by his refusal to be hogtied by the goody-good morality of the Space Patrol.

"Ship, it's time I named you. From now on, you're *Castle*."

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"Thank you, Vizad Olivine. I am *Castle*."

"And don't call me by my rank of vizad. Simply address me as Olivine. That will be more in keeping with my cover as an escaped prisoner who stole and mastered you. That's my cover, carefully developed by HQ over a period of eight years. As a criminal, I'm to infiltrate Dusty Roost, and with you to back me up, attain the highest position possible in Rooster leadership, in order to subvert the pirates."

"I understand, sir."

"Good. You were not led to doubt my authorization of mastery by the words of Proxad Coralon?"

"Not at all, sir. I am familiar with prison-ship security measures, sir, and am confident that, even during a pirate attack, you could not have escaped the *Barnaby* against the Patrol's wishes, sir."

Olivine gave a pleased nod, then thought again and felt anxiety hit the pit of his stomach.

That CIT computer was still dogging him!

But . . . *no*! Not any more. This time the escape wasn't rigged by the Patrol, to send him off like some automatic puppet on a string to do some errand! Escape would have been impossible without the assistance of his polywater doodle. Which the Patrol hadn't known about. He couldn't have got past his cage door without . . .

Still, the *Barnaby*'s power had gone on the blink just at the instant the door unlatched . . . and the doodle had been lying on the floor beyond the door.

He gave a soft snort of disgust with himself.

After all, even if the door had been meant to unlatch when the power blinked, it wouldn't have swung open if he hadn't been pushing against it.

And besides, the CIT computer wasn't that stupid . . . or didn't think he was that stupid. For his cage door to unlatch because of a power fluctuation was too obvious an invitation to escape! The computer would *know* he would get wise to a trick like that!

And above all, the Patrol wouldn't let a vizad's command cruiser fall in his hands by intention. Why, nothing short of total pacification of Dusty Roost could make up for the amount of crow the Patrol would have to eat over a blunder like that!

Having thought the matter through to his satisfaction, Olivine gave the pocket containing the doodle an affectionate pat. "Bourbon on the rocks, *Castle*," he ordered.

"Yes, sir."

The serving pedestal rose from the floor. Olivine picked up the frosty glass and drank a toast to his freedom.

Let the Patrol watch my smoke! he gloated silently. *Or* their *own smoke, because they're the ones who'll be burning!* ■

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PTOLEMY'S RED SIRIUS

One of the great difficulties in astrophysics is that we have such a short time-span of observation. Even the ephemeral stars—the super-giants that last only a million years or so—last far longer than human history. But it may be that some phenomena have been observed and misunderstood—

ROBERT S. RICHARDSON

Anyone who knows the stars at all must be familiar with Sirius the Dog Star. Sirius is the brightest star in the sky. On clear frosty winter evenings we see Sirius in the south sparkling like a diamond. That out-worn phrase "sparkling like a diamond" best expresses my feelings about Sirius. To me Sirius looks exactly like a beautiful blue-white diamond.

But suppose I told you that to me Sirius looks like a beautiful blood-red ruby sparkling in the southern sky? You would think I was either crazy or ought to have my eyes examined. Yet, if we are to believe the record, that is the way Sirius looked to Claudius Ptolemy, one of the most famous astronomers of antiquity. For here is Ptolemy's own description of Sirius in his great work the "Almagest" published about A.D. 140. ("Almagest" in Arabic means "The Greatest.")

"The brightest and *red* star in the face called the Dog." The italics are mine.

In those days when mirrors were not so common the stars of Canis Major, Orion, and Canis Minor, were probably more familiar to Ptolemy than the sight of his own face. Then why did he call Sirius red when plainly it is white? That is our question.

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The Easy Answers

The easiest explanation is that Ptolemy had some abnormality of vision so that white stars appeared to him as red. But such an explanation won't stand up for a minute. For in that case he would have listed all the other white stars in his catalog as red. Now, if a star was white, the old astronomers never mentioned its color. (Incidentally "old" depends upon when you were flourishing. Ptolemy in "Almagest" often refers to "observations by the 'ancients' ".) The bright stars Rigel and Betelgeuse near Sirius provide us with an excellent check. Ptolemy describes the red supergiant Betelgeuse (spectral class M2, Iab) as "The bright red star in the right shoulder"; and the supergiant white Rigel (spectral class B8, Ia) as "The bright star in the left foot common with the water." The "water" here refers to the water in the constellation of Eridanus the River. Neither does he mention the color of other bright white stars such as Vega, Altair, Regulus, and Procyon. But he describes Arcturus as "fiery" and Antares as "red." Hence there seems to be no evidence that Ptolemy's vision was abnormally color sensitive.

It is rather puzzling that he speaks of Pollux as "The red star in the head of the eastern Twin." Today I think we would call Pollux, or Beta Geminorum, spectral class KO III, white or yellowish white.

"But I've seen Sirius when it *did* look red!" you will protest.

Well, so have I, many times. In fact, I've seen Sirius flashing every color of the rainbow. And I'm not an anomalous trichromat either. I've had my eyes tested by an expert in that field.

The rainbow colors flashing from Sirius are also easily explained away. The atmosphere acts on light rays passing through it like a prism. The air bends the colors by increasing amounts from the longest visible red rays, through progressively shorter wavelengths orange, yellow, green, blue, to violet. Thus in traversing the atmosphere the colors in a white beam of starlight are spread apart or dispersed. The prismatic effect of the atmosphere is most noticeable when Sirius is near the horizon, rising or setting, so that its light reaches us through the longest air path. The rainbow colors we see flashing from Sirius when low in the sky arise simply from the atmospheric spectrum of the star. Similar color effects may be observed in other bright stars.

If Ptolemy had done his observing from some station in the far north where Sirius was always skirting along the horizon, we might understand why he called it red. But from what little we know of him he did all his observing in and around Alexandria in latitude 31 degrees north. Alexandria is

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about 9 degrees nearer the equator than the average latitude of the United States. Hence Ptolemy was better situated for observing Sirius than ourselves. That is, Sirius would have been generally higher in his sky than in ours, and the prismatic dispersion of the atmosphere on its rays less conspicuous.

Sirius to Other Observers

In 1543 the Polish astronomer, Nicolaus Copernicus, published a book entitled "On the Revolution of the Heavenly Spheres," in which he advanced some rather disturbing ideas on the motions of the Sun, Moon, and planets. His "De Revolutionibus," as it is generally known, also contained a revision of Ptolemy's old star catalog. (Which Ptolemy, in turn, got mostly from Hipparchus's catalog some three centuries earlier.) And Copernicus says nothing about Sirius being red. "The very bright star called Canis, in the mouth," is the way he puts it. Copernicus did his observing from Cracow in latitude 50 degrees north, a station much less favorably located for observing the southern stars than Alexandria. (There is a story, probably erroneous, that Copernicus in his whole life never saw the planet Mercury.)

What we would like very much to know is how Sirius looked to observers *before* Ptolemy. Reliable evidence is naturally harder to come by the farther we dig back in the archives. But the questions raised by Ptolemy's red Sirius have such profound implications for stellar evolution that chronologists have sifted every scrap of information bearing on the subject.

The clearest statement relating to the color of Sirius occurs in a fragment from the writings of Lucius Seneca about a century before Ptolemy. He remarks that the "redness of the Dog Star is deeper, that of Mars milder, that of Jupiter nothing at all, the splendor being turned to pure light." Still earlier we find references to the reddish color of Sirius among writings of the Egyptians and Assyrians.

The *earliest* evidence of Sirius *not* red comes from the Persian astronomer, Abderrahman Al-Sufi, A.D. 903-986, a careful observer whose stellar magnitudes were often used in preference to Ptolemy's. Al-Sufi says nothing about the color of Sirius, but simply omits it from his list of colored stars. If such a bright star had displayed so much as a hint of red or orange, it surely could not have escaped his notice.

We may assume on tolerably reliable evidence, therefore, that from about A.D. 200, and for a short time previous, Sirius was not white but red. What do we mean by a "short time?" We were hoping you wouldn't ask that question. Astronomically speaking, I suppose, any major change in a star in less than a thousand years might be charac-

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terized as "short," not to say "catastrophic."

Having disposed, we hope, of the easy explanations of a red Sirius, let us now start probing deeper.

What Do You Mean by "Bright"?

In what follows we shall be continually talking about the brightness of this object and that. Today we are not supposed to learn about things by studying them in books. We are supposed to learn about them by marching from Berkeley, to Oakland, for instance, although God knows why anybody in his right mind would want to walk to Oakland. Well, I seriously doubt if you can learn about stellar magnitudes that way.

Determining an accurate scale of stellar magnitudes has been a headache to astronomers for over a hundred years. I have never had occasion to work in this field, but I believe the photometric men now have their scale of magnitudes for the stars firmly established. I would be willing to bet, however, that their magnitude scale still will require working over when they begin taking observations from large Moon-based telescopes. Our atmosphere is such a complicating obstacle in magnitude determinations.

Ptolemy put fifteen of the brightest stars visible to him from Alexandria into magnitude 1, and the faintest he could see into magnitude 6. It is a little surprising that Ptolemy put four stars that most of us would call magnitude 1—Altair, Pollux, Antares, and Castor—into magnitude 2. Stars of intermediate brightness such as the five brightest in the Big Bear were magnitude 2; other fainter stars of the various constellations went into groups 3, 4, and 5. Astronomers for centuries were tremendously concerned with the location of the stars in the mythological figures outlining the sea monsters, giants, chained maidens, and other assorted celestial characters. Thus as nearly as I can identify them, Zeta Virginis is "The star under the girdle on the right buttock of the Virgin," Alpheratz, or Alpha Andromedae, is "The star common to the Horse's navel and Andromeda's head," et cetera. Modern astronomers would not have the foggiest notion of the anatomy of stellar positions.

The stellar magnitude scale may be confusing to you at first in that the stars get *fainter* as their magnitudes get *larger*. You can fix the idea by thinking of your *strength* getting *feebler* as your *age* gets *larger*.

You might suppose that a second magnitude star was one-half as bright as a first magnitude star; a third magnitude star one-third as bright; a sixth magnitude star one-sixth as bright, and so on. But the magnitude scale merely expresses *how bright* the different stars *look*. If you made measures on their light intensity with a photometer,

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TABLE I

Object	*Apparent Magnitude*	*Apparent Brightness (Stars of Big Dipper = 1)*
Sun	−26.5	251,200,000,000
Full Moon	−12.5	631,000
Venus at maximum	− 4.2	302
Sirius	− 1.42	23
Rigel	+ 0.14	5.5
Betelgeuse	+ 0.41	4.3
Average of seven stars of Big Dipper	+ 2.0	1.0
Naked-eye limit	+ 6.0	0.0251
6-inch telescope limit	+13.0	0.00004
200-inch photographic limit	+23.5	0.00000000251

you would find their brightness changes in quite a different way. You would find that a difference on 1 in magnitude between stars corresponds to a ratio of about 2.5 in luminosity. Astronomers finally agreed to make this ratio 2.512 *exactly*. This peculiar number 2.512 makes a first magnitude star just 100 times as bright as a sixth magnitude star. As you have probably already guessed, 2.512 is the 5th root of 100. So a first magnitude star is 2.512 times as bright as a second magnitude star; 2.512 × 2.512 or 6.30 times as bright as a third magnitude star, and so on.

The magnitude scale is naturally not restricted merely to the stars you can see, but extends indefinitely in either direction to fainter and brighter objects. Fainter objects have larger and larger positive magnitudes. Brighter objects have fractional and negative magnitudes. In Table I we have listed various celestial objects relative to the brightness of the seven familiar stars on the Big Dipper which we shall assume have an average magnitude of 2.0.

Apparent Vs. Absolute

Perhaps you have got a bit tired about our continual harping on apparent magnitudes and apparent luminosities. But there was a reason. The figures in Table I merely tell you is how bright these objects LOOK, not how bright they ARE. Naturally we can't say anything about their real, or absolute brightness, until we know their distances. Often we don't know their distances. For example, we don't know the distances of all the myriad stars at the photographic limit of the 200-inch Hale telescope.

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TABLE II

Object	Magnitudes		Absolute Brightness
	Absolute	*Apparent*	(*Sun* = *1*)
Rigel	− 6.8	+ 0.14	40,000
Betelgeuse	− 5.5	+ 0.41	12,000
Sirius A	+ 1.4	-- 1.42	21
Sun	+ 4.7	−26.5	1
Sirius B	+11.5	+ 8.7	0.0019
Wolf 359	+16.8	+13.7	0.000014
Venus	+29.1	− 4.2	0.00000000017
Full moon	+32.0	−12.5	0.000000000012

Now IF the stars were all at the SAME distance we could tell their absolute magnitudes at a glance. But if we know their distance and have measured their apparent magnitude we can immediately calculate their absolute magnitude at some arbitrary standard distance. Astronomers have found it convenient to make 10 parsecs their standard of distance. The parsec is the unit of distance used almost exclusively among astronomers. It is the distance of a star whose parallax is one second of arc. The system of Alpha Centauri comes closest to this idea with a parallax of ¾ seconds of arc, corresponding to a distance of 1.31 parsecs. In terms of the more popular light-year the distance of Alpha Centauri is 4.3 light-years, which is 25 million million miles.

Listing objects according to absolute magnitude forces us to do some radical rearranging in our concept of relative brightness, as shown in Table II. You see that many objects which loom very bright in our sky are actually rather faint, whereas others are way up in the hierarchy of luminosity.

You may be wondering why we bother to list an object's brightness according to magnitudes? Why don't we list it directly according to its real or apparent luminosity? Wouldn't it be a lot simpler that way?

Yes, I suppose it would be simpler. Then why don't we do it? Well, as women would say, "Just because." Which isn't such a foolish answer sometimes when you think about it. In this case, the reason is because our psychophysical system doesn't work that way. Because for some reason the intensity with which we perceive a stimulus is proportional—not *directly* to the stimulus—but to the *logarithm* of the stimulus. (The Weber-Fechner law of sensation.)

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The Weber-Fechner law may be of some consolation the next time you go to the dentist. Let us say the pain inflicted on one of your teeth today corresponds to a stimulus of 10. The dentist warns you that next time the pain inflicted will correspond to a stimulus of 100. But it won't feel 10 times as painful. It will feel only twice as painful. (The logarithm of 10 is 1, the logarithm of 100 is 2.) So far as I am aware nobody knows why we respond to stimuli this way.

Story idea!

Could life exist on a world whose inhabitants experience pain directly? Would not such creatures be too sensitive to stimuli to survive for long?

Sirius and Stellar Evolution

Can the theory of stellar evolution enable us to account for a red Sirius? Well . . . yes and no.

Astronomers right now are riding high on the idea that stars are formed by condensation from atoms and clouds of dust in interstellar space. They believe there is probably more matter *between* the stars of our galaxy than *in* the stars. Herschel's "Loch im Himmel," far from being holes in the heavens, are rather vast obscuring clouds that become apparent when they blot out dense star clouds behind them.

In such relatively congested regions of space, condensations must inevitably occur and become centers of attraction for surrounding material. These centers grow and ultimately develop into huge extended globular masses. Whether such spheres justify the name "stars" or not is a matter of definition, for certainly they do not shine. "Proto-stars" is the name generally applied.

As the mass contracts it eventually reaches a stage when the temperature at its center becomes high enough for nuclear reactions to start. Here we are not concerned with the details and manifold probabilities of the various possible reactions. Essentially they consist of the conversion of hydrogen into helium. As a star's hydrogen is consumed it contracts, its central temperature rises, and the star grows hotter and whiter.

Eventually a star reaches a comfortable state when it is able to derive its necessary energy from nuclear reactions rather than gravitational attraction. The star has now reached the point in its evolutionary career called "age zero." (In somewhat the same way that all racehorses become one-year-old on New Year's Day.) A star that shines by consuming its hydrogen is said to be on the "main sequence." The vast mass of stars are on the thickly populated main sequence. On the main sequence we find white stars of moderately high luminosity such as Altair and Fomalhaut, yellow stars like Pollux and the Sun, down to

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such faint red bodies as Wolf 359, Epsilon Indi, and BD+5°1668.

There is a temptation to draw an analogy between stars on the main sequence and stars of the stage who have arrived on Broadway. But such an analogy would be highly misleading. A star on the main sequence is in a stable secure state where it may continue shining serenely for hundreds of millions of years. But as an actress who ought to know once told me, "There is no such thing as security on the stage."

When the Hydrogen Begins to Fail

As with all good things, inevitably there comes a time when a star's supply of viable hydrogen approaches exhaustion. What to do? If the star intends to continue shining, it has no other choice but to fall back again on gravitational attraction. (We hope cosmologists won't castigate us too bitterly for anthropomorphizing the orbs of heaven this way. Sir Arthur S. Eddington used to be almost as bad in some of his writing.) The theoretical men tell us that a star contracting at this stage behaves in quite a different way than you might anticipate. Instead of becoming smaller and denser the star becomes larger and thinner. Contraction now produces such a rapid increase in temperature in the central core that new nuclear reactions start functioning. The result is the star balloons out enormously, so that despite its high central temperature, its outer layers become excessively rarified and cool. The resulting huge distended objects are appropriately called "red giants," or, if exceedingly luminous, "red supergiants." There are reasons for believing that all the heavy elements may be formed in the cores of the red giants. Aldebaran is a red giant; Antares, Betelgeuse, and Mira examples of red supergiants.

What Fate Red Giants?

What happens to a red giant when the energy from all its energy sources faces depletion?

That is hard to say. Presumably it starts contracting again. Possibly it becomes unstable turning into some sort of variable, or even a nova. Finally when BOTH nuclear and gravitational energy sources are virtually exhausted it settles down into its senile old age as a white dwarf, a body no bigger than a planet radiating so feebly in this senescent condition as to remain luminous for billions of years. Finally it reaches complete extinction as a black dwarf. It is doubtful if our galaxy is old enough to contain any black dwarfs. If so, they would certainly be difficult objects to uncover.

Fig. 1. Relative sizes of representative stars and approximate masses. From "A Brief Text in Astronomy," by Skilling and Richardson, Revised, Holt-Dryden, 1959.

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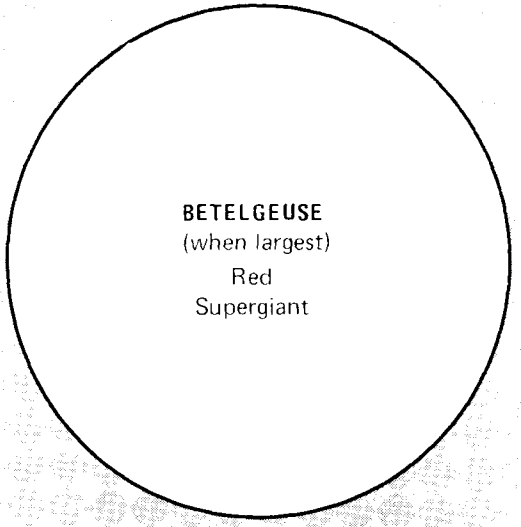

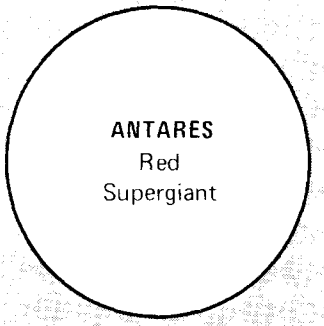

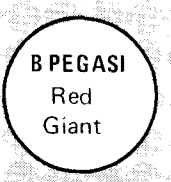

STAR	Approximate mass (Sun = 1)
Betelgeuse	15
Antares	10
Aldebaran	4
Rigel	100 (??)
Beta Pegasi	9
Sirius A	2.4
Sun	1
Sirius B	0.96

RIGEL
Blue-White
Super-Giant

ALDEBARAN
Red Giant

SUN
Yellow Dwarf

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How fast a star evolves depends in a very critical way upon its mass. The larger the mass of a star the faster its rate of evolution. A brilliant white supergiant of mass 25 suns is consuming hydrogen at such a profligate rate it may last for only a couple of million years. A sedate yellow dwarf like the Sun ought to be good for several billion years or more. A faint red dwarf of 0.8 solar masses for twice as long. We see that slight differences in mass among the stars can be of critical importance in determining their lifetimes. (Fig. 1)

Application to the Sirius System

Suppose that originally the Sirius system consisted of the two stars, A and B, A being the moderately bright white star we know now, but B being quite a different type of object. B was the object that evolved into the present white dwarf companion of A. Now B presumably evolved considerably faster than A. Hence originally B must have been considerably the more massive of the two. While star A was shining at essentially its present rate on the main sequence, B underwent a sudden metamorphosis into a red giant. While we're supposing, let's make Sirius B evolve rapidly into a luminous red supergiant of absolute magnitude −5.5.

How bright would the Sirius system have loomed in our night sky if composed of a supergiant of absolute magnitude −5.5 and a bright dwarf of absolute magnitude +1.4? Now the Sirius system is the fifth nearest the Earth, distant only 8.7 light years. Such a red supergiant Sirius would be a conspicuous object indeed, far outshining every celestial object except the Sun and Moon. With an apparent magnitude of −8.4, it would be 48 times as bright as Venus at maximum brilliancy and 620 times brighter than Sirius appears to us now. No nova within historical times has ever been nearly so bright, not even Tycho's nova of 1572 or the one in the Crab nebula of 1054. It is inconceivable that any object so bright that it cast a shadow at night and was easily visible in broad daylight could have passed unnoticed. Yet among ninety ancient novae recorded in China, Japan, and Korea, from the Fourteenth Century B.C. to A.D. 1690, there is not one that appeared near the Dog Star.

Let us be more realistic and make Sirius B a "normal" red giant like Aldebaran of absolute magnitude −0.2. Aldebaran combined with the present bright white star would give us an orange star of absolute magnitude −0.42. Such a stellar system would still produce a very bright object of apparent magnitude −3.3, outshining Venus except near maximum brilliancy.

We see that stellar evolution, assuming Sirius B as a former red giant, seems to provide us

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with a satisfactory explanation for Ptolemy's bright red star in the face of the Dog.

Not so!

For the assumptions we have been forced to make immediately involve us in even worse difficulties!

Reducing Aids

In the Sirius system *now* we have a bright white star of mass 2.4 Suns and a white dwarf of mass 0.96 Suns. (Hereafter we shall use the symbol ⊙ for the Sun.) The respective masses off the two components are very accurately known. The mass of Aldebaran is 4 ⊙.

Now originally Sirius B of necessity *must* have been more massive than Sirius A, since to reach its present white dwarf stage it *had* to evolve faster. But, if originally of mass 4 ⊙ like Aldebaran, it had perforce to get rid of at least 3 ⊙ s somewhere along the route, and get rid of them in a hurry, too.

Our first thought is of a nova outburst. We know that novae eject luminous shells with high velocity.

Half a century or so ago such a hypothesis would have seemed quite plausible. But today the nova outburst is regarded as a superficial phenomenon, a mere stellar "skin disease." From energy considerations the nova explosion, despite its spectacular appearance, is believed to involve scarcely as much as 1/100th of the Sun's mass. (Here we are talking about normal novae; supernovae are something else.)

But it seems to be possible for stars to lose mass continuously without going through the catastrophic nova process. Such a star is Alpha Herculis, a triple system consisting of a red giant and a faint companion which itself is a double. The whole system is enveloped in a cloud expanding at 22,000 miles per hour. It is estimated to be losing mass at the rate of one-millionth Suns per century. Which is much too slow to be of help to us in the Sirius system.

Thus again we are brought to a full stop. Cast about as we will we cannot explain a red Sirius.

Surrogate?

The fact that we can't explain something doesn't necessarily mean that it can't happen—an elementary fact we often overlook. Let us now make a rapid shift in our line of argument.

The Wonder Star in the South

In November, 1676, Edmund Halley, then age twenty-one, set sail for St. Helena, the same desolate little isle in the south Atlantic where Napoleon was to be banished one hundred thirty-nine years later. Halley, however, made the trip voluntarily for the purpose of observing the transit of Mercury over the Sun's disk on November 7, 1677 N.S. Halley, in a sense,

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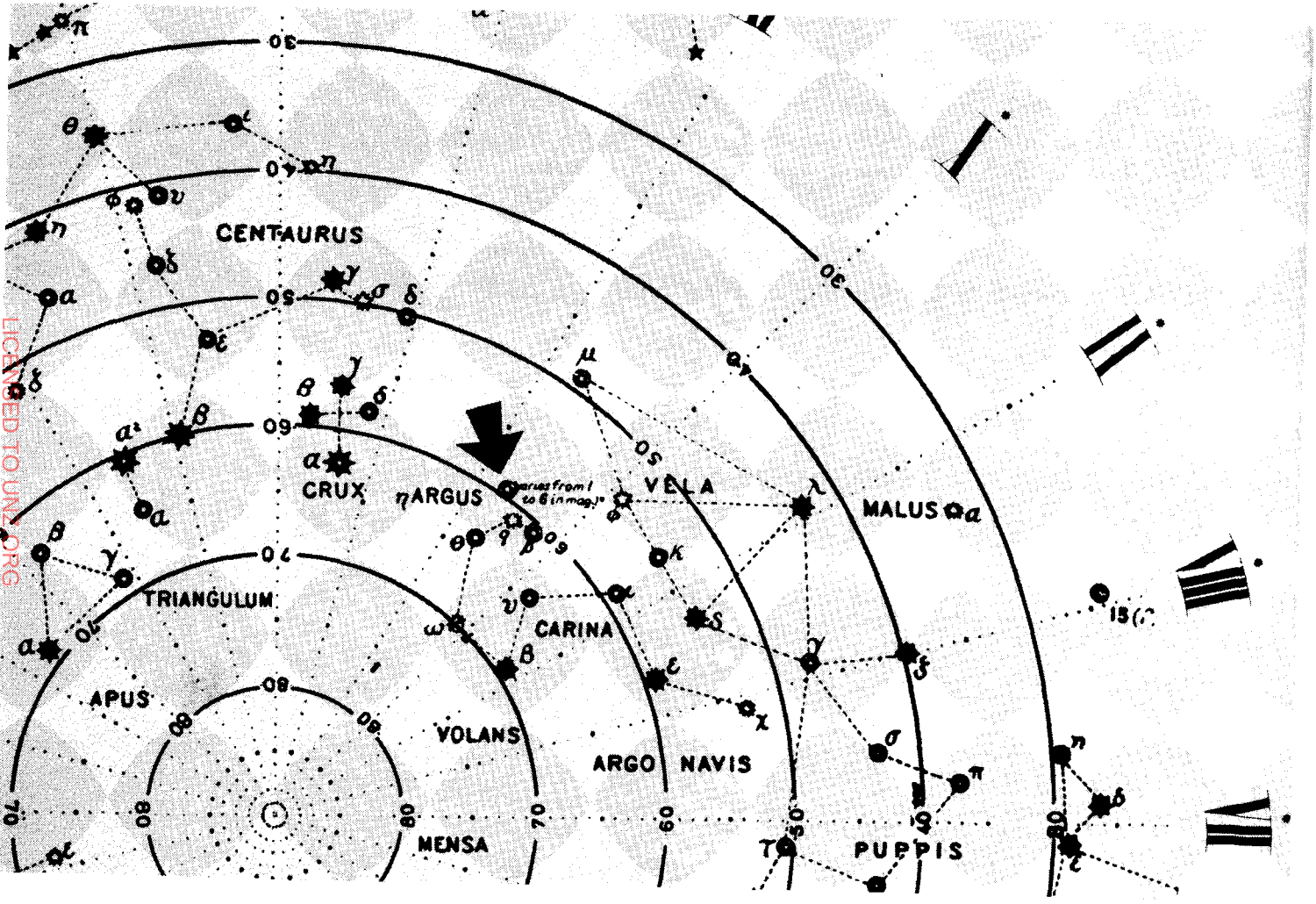

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was a college dropout, in that he left Oxford before obtaining his degree. Besides observing the transit, he also planned to make pendulum measures on gravity at this isolated station, as well as mapping the stars in the southern heavens invisible, or only visible with difficulty, from Europe.

Halley's return to England was a triumph. By official proclamation, Charles II ordered that he be granted a degree from Oxford, said degree to be granted *without* examination. Imagine the commotion such a proclamation would arouse today.

Halley was no dry-as-dust scientist viewing the world from the isolation of his ivory tower. (Incidentally, although I've been personally acquainted with hundreds of scientists, I have yet to meet one who dwelt in an ivory tower. Does anyone know where this much overworked expression originated?) Halley was very socially minded, as much at home mingling with the dubious characters at the court of Charles II as in presiding over the meetings of the Royal Society. I've often wondered if he ever danced with Nel Gwyn.

In Halley's survey of the southern heavens, he found a 4th magnitude star in the constellation of Argo Navis, the Ship of the Argonauts, which was not recorded in Ptolemy's "Almagest." He suspected the star of being variable and thought possibly it might have been too faint to have been recorded by Ptolemy. Halley designated the star Eta Argos, and so it remained until 1930, I believe, when this huge sprawling constellation was divided into Carina (the Keel), Puppis (the Poop), and Vela (the sails), of the ship Argo. Here we shall refer to this star by its current name at the time when observed. (Fig. 2)

It is perhaps significant that Halley was not above playing a little politics in his star gazing. He thoughtfully introduced a brand-new constellation into the southern heavens which he named Robur Carolinum, after his patron Charles II. Needless to say, Robur Carolinum met with scant favor outside the British Isles. Today you will search the southern heavens in vain for Robur Carolinum.

We hear no more of Eta Argos until 1751 when it was reported as magnitude 2. In 1827 the English botanist, Burchell, found it to be 1st magnitude, fully as bright as Alpha Crucis, the brightest star in the nearby Southern Cross.

Sir John Herschel, some ten years later, while observing at the

Fig. 2. Position of Eta Carinae (formerly Eta Argos) indicated by arrow is: Right Ascension $10^{h}\ 43^{m}.0$ Declination $-59°\ 25'$ Epoch 1950.0

Eta Carinae is about 7th magnitude, too faint to be seen without field glasses.

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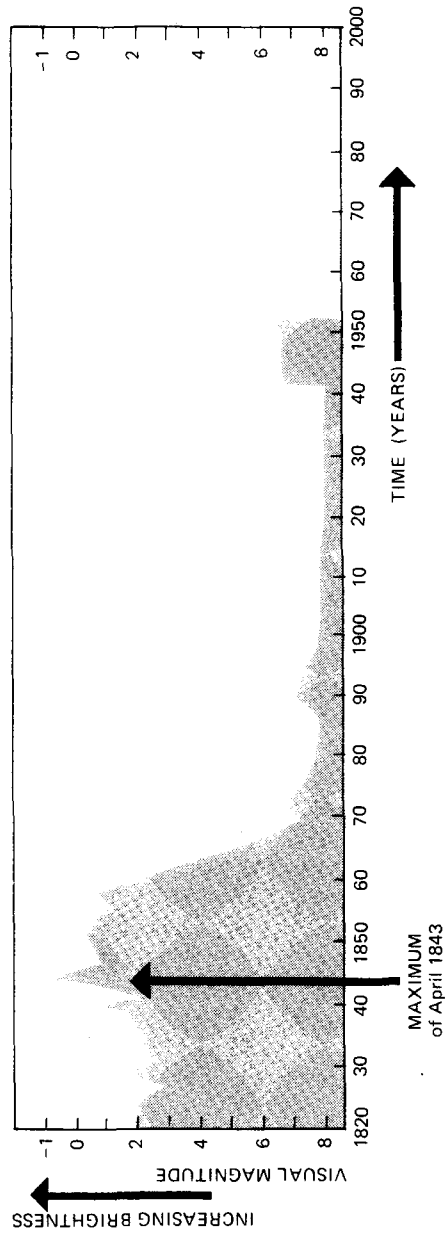
Cape of Good Hope, remarked that Eta Argos was variable between the 1st and 2nd magnitudes. Apparently its variability was not sufficiently striking to cause him to suspect it as being an especially abnormal object. But on December 16, 1837, he writes that his "astonishment was excited by the appearance of a new candidate for distinction among the very brightest stars of the first magnitude, in a part of the heavens with which being perfectly familiar, I was certain that no such brilliant object had been seen before. After momentary hesitation . . . I became satisfied of its identity with my old acquaintance Eta Argos."

The greatest flare-up of Eta Argos occurred in April 1843, when it rose to magnitude −1.0, on the modern scale of magnitudes. Its brightness was then exceeded by no other star in the sky with the single exception of Sirius. It soon began to fade and by 1870 had fallen below naked-eye visibility to magnitude 7, where it still remains unless it has undergone a recent upsurge. The numerous fluctuations in the magnitude of this remarkable object up to 1952 are shown in Fig. 3.

Unfortunately for the numerous amateur variable star observers in this country, Eta Carinae, as we shall call it now, is barely visible from Florida, Hawaii, and the Texas Panhandle. It gets above the southern horizon briefly at mid-



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night around March 1st, and four minutes earlier each succeeding night thereafter. To identify Eta Argos you will need a star map and binoculars.

". . . some unknown physical process . . ."

A noted astronomer has called Eta Carinae "one of the most perplexing stars in the heavens." It is impossible to pigeonhole it among any of the numerous variables. Probably it is best described as an "abnormally slow nova." Several times close companions have been detected around it, but it is believed they are not diminutive dwarf stars but more likely gaseous condensations ejected with high velocity.

Combining the spectroscopic radial velocities of these companions with their angular separation from the star, we can make an estimate of the distance of Eta Carinae—3,900 light-years. Only an exceedingly luminous star could attain apparent magnitude −1.0 at so great a distance: Deneb at 1,400 light-years is of apparent magnitude +1.26, and Rigel at 800 light-years appears as magnitude +0.14. If Eta Carinae was of magnitude −1.0 in 1843, it must have had an absolute magnitude of −11.4, almost luminous enough to make a "dwarf supernova" out of it, if we may be permitted such a term. Even now at apparent magnitude +7, it has an absolute magnitude of −3.4, about the same as the highly luminous Spica.

Fig. 3. The variations in the apparent visual magnitude of Eta Carinae from 1800 to about 1952. In 1843, Eta Carinae reached its greatest known brightness of −1, when it outshone every star except Sirius. "The Wonder Star Eta Carinae," by G. De Vaucouleurs, Courtesy Astronomical Society of the Pacific.

And It's Red!

The best part about Eta Carinae as a surrogate, or stand-in, for Sirius B is its reddish color, which has persisted to the present day. This fiery tint was especially noticeable at the great maximum of 1843, when its color was likened to that of Arcturus and Aldebaran. Spectrograms show this red color comes from intense emission in the red H alpha line of glowing hydrogen. Recently the discovery of powerful infrared emission in Eta Carinae has led to a strong suspicion that some unknown physical process is taking place.

Now, if Eta Carinae would only be obliging enough to do a quick changeover into a white dwarf, our case would be complete. Of course, the mere fact that we know of one star which satisfies our principal requirements for Ptolemy's red Sirius doesn't *prove* a thing. All it does is make the situation seem less hopeless.

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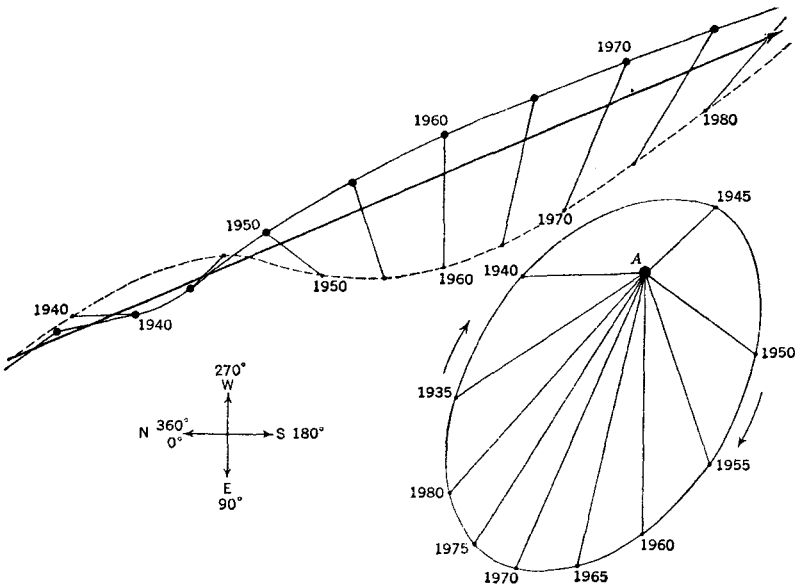

Fig. 4. If Sirius were an isolated star it would move in the straight line indicated by the arrow. Instead it was found to be moving in the sinuous line shown by the heavy curve. Faint companion is blotted out when close to bright star as in 1940. Companion was well situated for observation in 1970, as they were near maximum separation.

From "A Brief Test in Astronomy," by Skilling and Richardson, Holt-Dryden, 1959.

A Suggestion from the "Spook Sonata"

Here is a little contribution of my own to this much debated subject.

In August Strindberg's play "The Ghost Sonata," Scene 3, he gives the character, the Student, the following line:

"But the largest and most beautiful of all the stars in the firmament, the golden-red Sirius, is the narcissus with its gold and red chalice and its six white rays."

Evidently Sirius looked the same to Strindberg as it did to Ptolemy!

Strindberg is considered the greatest writer that Sweden has yet produced. His "Spöksonaten," written in 1907, is generally regarded as the best Chamber Play written for his own intimate theater.

Strindberg, like most great creative geniuses, was dead broke and

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half-crazy during most of his writing career. Artists often are prone to speak of their blue-green period, but from about 1894 to 1898 Strindberg went through what he described as his "Inferno Period." Psychoanalysts would probably have classified him as a paranoid schizophrenic. He was an avowed misogamist who publicly denounced the new emancipated "Ibsen" women who were beginning to rear their ugly heads in Europe late in the last century. So he proceeded to marry three such females with shattering consequences to all concerned.

Strindberg was intensely interested in science, and for some ten years carried on intensive experiments trying to convert sulfur into gold, an occupation which his second wife regarded with no enthusiasm whatever. For a while he almost convinced himself he should abandon creative writing to devote himself entirely to alchemy.

Whether crazy nor not, however, I find it hard to understand why Strindberg called Sirius "golden-red." Like most writers, he stored up every scrap of experience that might conceivably be useful to him. And almost invariably it *did* prove useful. Strindberg never wasted anything. I firmly believe that Strindberg called Sirius "golden-red" because that was the way this star looked to him.

WHAT I WOULD LIKE TO KNOW IS WHETHER THERE ARE OTHER PEOPLE TO WHOM SIRIUS LOOKS RED? Readers of this magazine, for instance. No cheating or fabrications, please.

The Future

That Sirius must have a faint companion pulling it out of its straight-line path was predicted mathematically by Bessel in 1843, from the sinuous course of the bright star (Fig. 4). This faint companion was sighted by the Alvin Clarks in 1862, who were not looking for it at the time, but engaged in testing a new telescope lens. But its amazing character as a small white star was not revealed until 1915 by W. S. Adams at Mount Wilson. Its composition of inconceivably high-density "degenerate" matter was established from the quantum theory about 1925.

Does the system of Sirius hold other revelations for us? It would not be too surprising. Three experienced double-star observers have reported seeing the companion itself as double; indeed, one claimed he saw it "persistently" double. Who knows what we may find in the Sirius system when we can examine it with powerful Moon-based telescopes, free from the agitation and diffusion of light that makes the image such a difficult object for investigation even under the most favorable conditions in our present terrestrial instruments? ■

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THE CLAW AND THE CLOCK

So many people confuse "He doesn't . . ." with "He can't . . ."
And that can be Step One to a total disaster. . . .

CHRISTOPHER ANVIL
Illustrated by Leo Summers

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Iadrubel Vire glanced over the descriptive documents thoughtfully.

"A promising world. However, considering the extent of the Earthmen's possessions, and the size of their Space Force, one hesitates to start trouble."

Margash Grele bowed deferentially.

"Understood, Excellency. But there is a significant point that we have just discovered. We have always supposed this planet was a part of their Federation. It is not. It is *independent.*"

Vire got his two hind ripping claws up onto their rest.

"Hm-m-m . . . How did we come by this information?"

"One of their merchant ships got off-course, and Admiral Arvast Nade answered the distress signal." Grele gave a bone-popping sound, signifying wry humor. "Needless to say, the Earthmen were more distressed after the rescue than before."

Vire sat up.

"So, contrary to my specific instructions, Nade has given the Earthmen pretext to strike at us?"

"Excellency, restraint of the kill-instinct requires high moral development when dealing with something as helpless as these Earthmen. Nade, himself, did not take part in the orgy, of course, but he was unable to restrain his men. It was the Earthlings' fault, because they were not armed. If they had been in full battle armor, with their tools of war—Well, who wants to crack his claws on a thing like that? But they presented themselves as defenseless offerings. The temptation was too great."

"Were the Earthmen aware of the identity of the rescue craft?"

Grele looked uneasy.

"Admiral Nade feared some trap, and . . . ah . . . undertook to forestall treachery by using an Ursoid recognition signal."

Vire could feel the scales across his back twitch. This fool, Nade, had created out of nothing the possibility of war with both Earth *and* Ursa.

Vire said shortly, "Having given the Ursoid recognition signal, the Earthmen naturally would not be prepared. Therefore Nade would naturally be unable to restrain his men. So, what—"

Grele gave his bone-grinding chuckle, and suddenly Vire saw it as amusement at the ability of Nade to disobey Vire's orders, and get away with it.

Vire's right-hand battle-pincer came up off its rest, his manipulators popped behind his bony chest armor, three death-dealing stings snicked into position in his left-hand battle pincer—

Grele hurtled into a corner, all claws menacingly thrust out, but screaming, "Excellency, I meant no offense! Forgive my error! I mean only respect!"

"*Then get to the point!* Let's have the *facts!*"

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Grele said in a rush, "Admiral Nade saved several Earthlings, to question them. They saw him as their protector, and were frank. It seems the Earthmen on this planet have a method for eliminating warlike traits from their race, and—"

"From their race *on this planet alone?*"

"Yes. The planet was settled by very stern religionists, who believe in total peace unless attacked. They eliminate individuals who show irrepressible warlike traits."

Vire settled back in his seat. "They believe in 'Total peace, unless attacked.' *Then* what?"

"Apparently, they believe in self-defense. A little impractical, if proper precautions have not been made."

"Hm-m-m. How did the crewmen know about this?"

"They had made many delivery trips to the planet. It seems that the Earthmen call this planet, among themselves, 'Storehouse.' The code name is given in the documents there, and it is formally named 'Faith.' But to the Earthmen, it is 'Storehouse.' "

"Why?"

"These religious Earthlings have perfected means to preserve provisions with no loss whatever. Even live animals are in some way frozen, gased, irradiated—or somehow treated—so they are just as good when they come out as when they went in. This is handy for shippers who have a surplus due to a temporary glut on the market, or because it's a bad year for the buyers. So, within practicable shipping distance, Storehouse does a thriving business, preserving goods from a time of surplus to a time of need."

Vire absently grated his ripping claws on their rests.

"Hm-m-m . . . And the basis of this process is not generally known?"

"No, sir. They have a monopoly. Moreover, they use their monopoly to enforce codes of conduct on the shippers. Shippers who employ practices they regard as immoral, or who deal in goods they disapprove of, have their storage quotas cut. Shippers they approve of get reduced rates. And they are incorruptible, since they are religious fanatics—like our Cult of the Sea, who resist the last molt, and stick to gills."

"Well, well, this *does* offer possibilities. But, would the Earthmen be willing to lose this valuable facility, even if it is not a member of their Federation? On the other hand—I wonder if these fanatics have antagonized the Earthmen as the cursed sea cult antagonizes us? That collection of righteous clams."

Grele nodded. "From what Admiral Nade learned, it certainly seems so. The crew of the distressed ship, for instance, had just had their quota cut because they had been caught 'shooting craps'—a form of gambling—while on their own ship waiting to unload."

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"Yes, that sounds like it. Nade, I suppose, has his fleet in position?"

"Excellency, he chafes at the restraints."

"No doubt."

Vire balanced the possibilities.

"It is rumored that some who have attacked independent Earth-settled planets have not enjoyed the experience."

"The Earthlings would be bound to spread such rumors. But what can mere religious fanatics do against the guns of our men? The fanatics are skilled operators of a preserving plant; of what use is *that* in combat?"

Vire settled back. Either the Earthmen were truly unprepared, in which case he, Vire, would receive partial credit for a valuable acquisition; or else the Earthmen *were* prepared, and Nade would get such a dent in his shell that his reputation would never recover.

"All right," said Vire cheerfully, "but we must have a pretext—these religious fanatics must have delivered some insult that we want to avenge, and it must fit in with their known character. If possible, it must rouse sympathy, even, for us. Let's see . . ."

Elder Hugh Phillips eyed the message dourly.

"These lobsters have their gall. Look at this."

Deacon Bentley adjusted his penance shirt to make the bristles bite in better, and took the message. He read aloud in a dry methodical voice:

" 'Headquarters, the Imperial Hatchery, Khlaftschffran'—lot of heathenish gabble there, I'll skip all that. Let's see '. . . Pursuant to the blessings of the' . . . heh . . . 'fertility god Fflahvritschtsvri . . . Pursuant to the blessings of the fertilty god, What's-His-Name, the Royal Brood has exceeded expectations this season, all praise to So-and-So, et cetera, et cetera, and exceeds the possibility of the Royal Hatchery to handle. We, therefore, favor you with the condescension of becoming for the next standard year an Auxiliary Royal Hatchery, consecrated according to the ritual of Fflahvrit . . . et cetera . . . and under due direction of the Imperial Priesthood, and appropriate Brood Masters, you to receive in addition to the honor your best standard payment for the service of maintaining the Royal Brood in good health, and returning same in time for the next season, undamaged by the delay, to make up the deficiency predicted by the Brood Masters. The fertility god, What's-His-Name, directs us through his Priesthood to command your immediate notice of compliance, as none of the precious Brood must be endangered by delay.' "

Deacon Bentley looked up.

"To make it short, we're supposed to store the royal lobsters for a year, is that it?"

"Evidently."

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"There's no difficulty there." Bentley eyed the message coldly. "As for being consecrated according to the lobster's fertility god, *there* we part company."

Elder Phillips nodded.

"They *do* offer good pay, however."

"All worldly money is counterfeit. The only reward is in Heaven."

"Amen. But from their own heathen viewpoint, the offer is fair. Obviously, we can't accept it. But we must be fair in return, even to lobsters. We will take care of the Royal Brood, but as for their Priesthood"—he cleared his throat—"with due humility, we must decline that provision. Now, who writes the answer?"

"Brother Fry would be ideal for it."

"He's on a fast. How about Deacon Fenell?"

"No good. He went into a cell on Tuesday. Committed himself for a month."

"He did, eh? Able's boy, Wilder, would have been good at this. Too bad."

Phillips nodded.

"Unfortunately, not all can conquer their own nature. Some require grosser enemies." He sighed. "Let's see. How do we start the thing off?"

"Let's just say, 'We will put up your brood for so-and-so much per year. We decline the consecration.' That's the gist of the matter. Then we nail some diplomacy on both ends of it, dress it up a little, and there we are."

"I wish Brother Fry were here. This nonsense can eat up time. However, he's *not* here, so let's get at it."

Iadrubel Vire read the message over again intently:

From:
Central Contracting Office
Penitence City
Planet of Faith
To:
Headquarters
The Imperial Hatchery
Khlaftschiffranzitschopendischkla
Dear Sirs:

We are in receipt of your request of the 22nd instant that we put the excess of the Royal Brood in storage for a period approximating one standard year.

We agree to do this, in accord with our standard rate schedule "D" appended, suitable for nonpreferred live shipments. Kindly note that these rates apply from date of delivery to the storehouse entrance, to date of reshipment from the same point.

We regret that we must refuse your other terms, to wit:

a) Accompaniment of the shipment by priests and broodmasters.

b) Consecration to the fertility god, referred to in your communication.

In reference to a), no such accompaniment is necessary or allowed.

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In reference to b), the said god, so-called, is, of course, nonexistent.

In view of the fact that your race is known to be heathen, these requests will not be held against you in determining the rate schedule, beyond placing you in the nonpreferred status.

We express our appreciation for this order, and trust that our service will be found satisfactory in every respect.

Truly yours,
Hugh Bentley
Chief Assistant
Central Contracting Office

Vire sat back, absently scratched his ripping claws on their rest, reached out with a manipulator, and punched a call-button.

A door popped open, and Margash Grele stepped in and bowed.

"Excellency?"

"Read this."

Grele read it, and looked up.

"These people are, as I told you, sir, like our sea cult—only worse."

"They certainly take an independent line for an isolated planet dealing with an interstellar empire—and on a sensitive subject, at that."

"Not so, Excellency. It is independent from *our* viewpoint. If you read between the lines, you can see that, for *them*, they are bent over backwards."

Vire absently squeaked the sharp tips of his right-hand battle claw together.

"Maybe. In any case, I don't think we would be quite justified by this reply in doing anything drastic. However, I think we can improve on this. Tell Nade to get his claws sharpened up, and we'll see what happens with the next message."

Hugh Phillips handed the message to Deacon Bentley.

"There seems to have been something wrong with our answer to these crabs."

"What, did we lose the order? Let's see."

Bentley's eyebrows raised.

"Hm-m-m . . . 'Due to your maligning the religious precepts of our Race, we must demand a full retraction and immediate apology . . .' When did we do that?"

"There was something about that part where we said they were heathens."

"They *are* heathens."

"I know."

"Truth is Truth."

"That is so. Nevertheless—well, Brother Fry would know how to handle this."

"Unfortunately, he is not here. Well, what to do about this?"

Phillips looked at it.

"What is there to do?"

Bentley's look of perplexity cleared away.

"True. We can't have lobsters giving us religious instruction." He looked wary. "On the other hand, we mustn't fall into the sin of pride, either."

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"Here, let's have a pen." Phillips wrote rapidly, frowned, then glanced at Bentley. "How is your sister's son coming along? Her next-to-eldest?"

Bentley shook his head.

"I fear he is not meant for righteousness. He has refused to do his penances."

Phillips shook his head, then looked at what he had written. After a moment, he glanced up.

"If the truth were told, some of us shaved by pretty close, ourselves. I suppose it's to be expected. The first settlers were certainly descended from a rough lot." He cleared his throat. "I am not so sure my eldest is going to make it."

Bentley caught his breath.

"Perhaps you judge too harshly."

"No. As a boy, he did not *play* marbles. He lined them up in ranks, and studied the formations. We would find him with his mother's pie plate and a pencil, holding them to observe how a space fleet in disk might destroy one in column. I have tried to . . ." Phillips cleared his throat. "Here, read this. See if you can improve it. We must be strictly honest, and must not truckle to these heathens. It would be bad for them as well as us."

"Amen, Elder. Let's see, now—"

Iadrubel Vire straightened up in his seat, reread the message, and summoned Margash Grele.

Margash bowed deferentially.

"Excellency?"

"This is incredible. Read this."

Grele read aloud:

" 'Sirs: We acknowledge receipt of yours of the 28th instant, and are constrained, in all truth, to reply that you are heathen; that your so-called fertility god is no god at all; that your priests are at best misled, and at worst representatives of the devil; and that we can on no account tolerate priests of heathen religions on this planet. As these are plain facts, there can be no retraction and no apology, as there is no insult, but only a plain statement of truth. As a gesture of compromise, and to prove good will, we will allow one (1) broodmaster to accompany the shipment, provided he is not a priest of any godless 'religion,' so-called. We will not revise the schedule of charges on this occasion, but warn you plainly that this is our final offer. Truly yours . . .' "

Grele looked up blankly.

Vire said, "There is a tone to this, my dear Grele, that does not appear consistent with pacifism. Not with pacifism as *I* understand the word."

"I certainly see what you mean, sir. Nevertheless, they *are* pacifists. We have carefully checked our information."

"And we are *certain* they are not members of the Federation?"

"Absolutely certain."

"Well, there is *something* here

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that we do not understand. This message could not be better planned if it were a bait to draw us to the attack."

"It is certainly an insulting message, but one well suited to our purpose."

"That, too, is suspicious. Events rarely fall into line so easily."

"Excellency, they are religious fanatics. There is the explanation."

"Nevertheless, we must draw the net tighter before we attempt to take them. Such utter fearlessness usually implies either a formidable weapon, or a formidable protector. We must be certain the Federation does not have some informal agreement with this planet."

"Excellency, Admiral Nade grows impatient."

Vire's right-hand battle claw quivered. "We will give him the chance to do the job, once we have done ours. We must make certain we do not send our troops straight into the jaws of a trap. There is a strong Space Force fleet so situated that it *might* intervene."

General Larssen, of the Space Force, looked up from copies of the messages. "The only place in this end of space where we can store supplies with *no* spoilage, and they have to wind up in a fight with the lobsters over royal lobster eggs. And we aren't allowed to do anything about it."

"Well, sir," said Larssen's aide, "they *were* pretty insulting about it. And they've had every chance to join the Federation. It's hard to see why the Federation should take on all Crustax for them now."

" 'All Crustax,' nuts. The lobsters would back down if we'd ram a stiff note down their throat. Do we have any reply from the . . . er . . . 'court of last resort' on this?"

"No, sir, they haven't replied yet."

"Much as I dislike them, they don't pussyfoot around, anyway. Let's hope—"

There was a quiet rap, and Larssen looked up.

"Come in!"

The communications officer stepped in, looking serious.

"I wanted to bring you this myself, sir. The Interstellar Patrol declines to intervene, because it feels that the locals can take care of themselves."

Larssen stared. "They're a bunch of pacifists! All *they're* strong at is fighting off temptation!"

"Yes, sir. We made that point. All we got back was, 'Wait and see.' "

"Well, we tried, at least. Now we've got a ringside seat for the slaughter."

Admiral Nade was in his bunk when the top priority message came in. His aide entered the room, approached the bunk, and hesitated. Nade was completely covered up, out of sight.

The aide looked around ner-

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vously. The chief was a trifle peevish when roused out of a sound sleep.

The aide put the message on the admiral's cloak of rank on the nightstand near the bunk, retraced his steps to the hatch, opened it wide, then returned to the bunk. Hopefully, he waited, but Nade didn't stir.

The aide spoke hesitantly: "Ah . . . a message, sir." Nothing happened. He tried again.

Nade didn't move.

The aide climbed over the raised lip of the catch tray, took hold of the edge of the bunk, dug several claws into the wood in his nervousness, and cautiously scratched back a little of the fine white sand. The admiral was in there *somewhere.* He scratched a little more urgently. A few smooth pebbles rattled into the tray.

Just then, he bumped something.

Claws shot up. Sand flew in all directions.

The aide fell over the edge of the tray, scrabbled violently, and hurled himself through the doorway.

The admiral bellowed, "WHO DARES—"

The aide rounded corners, and shot down cross-corridors as the admiral grabbed his cloak of rank, then spotted the message.

Nade seized the message, stripped off various seals the message machine had plastered on it, growled: "The fool probably wants *more* delay." Then he tore open the lightproof envelope that guaranteed no one would see it but him, unfolded the message itself, and snarled, " '. . . received your message #4e67t3fs . . . While I agree—' Bah! ' . . . extreme caution is advised . . .' That clawless wonder! Let's see, what's this? '. . . Provided due consideration is given to these precautions, you are hereby authorized to carry out the seizure by force of the aforesaid planet, its occupation, its annexation, and whatever ancillary measures may appear necessary or desirable. You are, however, warned on no account to engage forces of the Federation in battle, the operation to be strictly limited to the seizure, et cetera, of the aforesaid planet. If possible, minimum damage is to be done to the planet's storage equipment, as possession of this equipment should prove extremely valuable . . .' Well, he's a hard-shell, after all! Let's see . . . 'Security against surprise by Federation forces will be employed without however endangering success of the operation by undue dividing of the attacking force . . .' *That* doesn't hurt anything. Now, the quicker we take them, the better!"

He whipped his cloak of rank around him, tied it with a few quick jerks of his manipulators, strode into the corridor, and headed for the bridge, composing an ultimatum as he went.

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Elder Phillips examined the message, and cleared his throat. "We appear to have a war on our hands."

Deacon Bentley made a clucking noise. "Let's see."

Phillips handed him the message. Bentley sat back.

"Ha-hm-m-m 'Due to your deliberately insulting references to our religion, to your slandering of our gods, and to your refusal to withdraw the insult, we are compelled to extend claws in battle to defend our honor. I hereby authorize the Fleet of Crustax to engage in lawful combat, and have notified Federation authorities as the contiguous independent power in this region that a state of war exists. Signed, Iadrubel Vire, Chief Commander of the Forces.' Well, it appears, Elder, that our message was not quite up to Brother Fry's level. Hm-m-m, there's more to this. Did this all come in at once?"

"It did, Deacon. The first part apparently authorizes the second part."

"Quite a different style, this. 'I, Arvast Nade, Commander Battle Fleet IV, hereby demand your immediate surrender. Failure to comply within one hour, your time, following receipt of this ultimatum, as determined by my communications center, will open your planet to pillage by my troops. Any attempt at resistance will be crushed without mercy, and your population decimated in retaliation. Any damage,

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or attempted damage, by you to goods or facilities of value on the planet will be avenged by execution of leading citizens selected at my command. By my fiat as conqueror, your status, retroactive to the moment of transmission of this ultimatum, is that of bond-sleg to the conquering race. Any lack of instantaneous obedience will be dealt with accordingly. Signed, Arvast Nade, Battle Fleet Commander.' "

Deacon Bentley looked up.

"What do we do with this?"

"I see no alternative to activating War Preventive Measures, as described in Chapter XXXVIII of the Lesser Works."

"I was afraid of that. Well . . . so be it."

"We can't have a war here. As soon as we saw a few of these heathen loose on the planet, we'd all revert to type. You know what *that* is."

"Well, let's waste no time. You take care of that, and I'll answer this ultimatum. Common courtesy requires that we answer it, I suppose."

Arvast Nade got the last of his battle armor on, and tested the joints.

"There's a squeak somewhere."

"Sir?" said his aide blankly.

"There's a squeak. Listen."

It could be heard plainly:

Squeak, squeak, squeak, squeak, squeak.

The aide got the oil can. "Work your claws one at a time, sir . . . Let's see . . . Again. *There* it is!'

"Ah, good," said Nade, working everything soundlessly. "That's what comes of too long a peace. And this stuff is supposed to be rustproof!"

There was a polite rap at the door. The aide leaned outside, and came back with a message. "For you, sir. It's from the Storehousers."

"Good. Wait till I get a hand out through this . . . uh . . . the thing is stiff. There, let's have it."

Reaching out with a manipulator through a kind of opened trapdoor in the armor, and almost knocking loose a hand-weapon clamped to the inside, Nade took hold of the message, which was without seals or embellishments, as befitted the mouthings of slegs.

Behind the clear visor, Nade's gaze grew fixed as he read:

From:
Central Contracting Office
Penitence City

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Planet of Faith
To:
Arvast Nade
Commander
Battle Fleet IV
Crustax
Dear Sir:

We regret to inform you that we must decline the conditions mentioned in your message of the 2nd instant. As you may be aware, the planetary government of the planet Faith does not recoginze war, and can permit no war to be waged on, or in the vicinity of, this planet. Our decision on this matter is final, and is not open to discussion.

Truly yours,
Hugh Bentley
Chief Assistant
Central Contracting Office

Nade dazedly handed the message to his aide.

"And just how," he demanded, "are they going to enforce *that?*"

Elder Phillips's hand trembled slightly as he reached out to accept the proffered hand of the robed figure.

"Judge Archer Goodwin," said the dignitary politely. "Elder, I bring you tidings of your eldest son, and I fear you will not find them happy tidings."

Phillips kept his voice level.

"I suspected as much, Judge."

"With due allowance for the fallibility of human judgment, Lance appears unsuited to a life of peace. Study bores him. Conflict and its techniques fascinate him. He is pugnacious, independent. He sees life in terms of conflict. He is himself authoritative, though subject to subordination to a superior authority. He is not dull. The acquisition of useful skills, and even a quite deep knowledge, are well within his grasp, potentially. However, his basic bent is in another direction. On a dffierent planet, we might expect him to shine in some limited but strategically-placed field, using it as a springboard to power and rank. Here, to allow him to pass into the populace would require us, out of fairness, to allow others to do the same. But the proportions of such traits are already so high that our way of living could not endure the shock. You see, he not only possesses these traits, plus a lust to put them in action, but *he sees nothing wrong with this.* Accordingly, he will not attempt to control his natural tendencies. Others of even greater combativeness have entered our population, but have recognized the sin of allowing such tendencies sway, unless the provocation is indeed serious. Then—" Judge Goodwin's face for an instant bent into a chilling smile, which he at once blinked away. He cleared his throat. "I am sorry to have to bring you this news."

Elder Phillips bowed his head. Somehow, somewhere, he had failed in proper discipline, in stern counsel. But, defiant, the boy al-

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ways—He put down the thoughts with an effort. Others took their place. People would talk. He would never live this down, would never know if a word, or a tone of voice, was a sly reference.

His fists clenched. For an instant, everything vanished in rage. Sin of sins, in a blur of mental pictures, he saw himself seek similarly afflicted parents—the planet teemed with them—rouse them to revolt, saw himself outwit the guards, seize an armory, arm the disaffected, and *put this unholy law to the test of battle!*

So real was the illusion that for an instant he felt the sword in his hand, saw the Council spring to their feet as he stepped over the bodies of the guards; his followers, armed to the teeth, were right behind him as he entered—

With a sob, he dropped to his knees.

The judge's hand gripped his shoulder. "Be steadfast. With the aid of the Almighty, you will conquer this. You can do it. Or you would not be here."

Arvast Nade studied the green and blue sphere swimming in the viewscreen.

"Just as I thought. They lack even a patrol ship."

"Sir," said the aide, "another message from the Storehousers."

Nade popped open his hatch, and reached out.

Gaze riveted to the page, he read:

From:
Office of the Chief
War Prevention Department
Level VI
Penitence City
Planet of Faith
To:
Arvast Nade
Commander
Battle Fleet IV
Crustax
Sir:

We hereby deliver final warning to you that this Department will not hesitate to use all measures necessary to bar the development of war on this planet or in its contiguous regions.

You are warned to signify peaceful intent by immediately altering course away from our planet. If this is impossible, signal the reason at once.

Hiram Wingate
Chief
War Prevention Dept.

Nade lowered the message. He took another look at the screen. He looked back at the message, then glanced at his aide.

"You've read this?"

"Certainly, sir. Communications from slegs have no right of privacy."

"How did it seem to you?"

The aide hesitated. "If I did not know they were disarmed pacifists, who destroy every warlike son born to them—well, I would be worried, sir."

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"There is certainly a very hard note to this message. There is even a tone of command that can be heard in it. I find it difficult to believe this could have been written by one unfamiliar with and unequipped for war."

Nade hesitated, then activated his armored-suit communicator.

"Alter course ten girids solaxially outward of the planet Storehouse."

Nade's aide looked shocked.

The admiral said, "War is not unlimited heroics, my boy. We lose nothing from this maneuver but an air of omnipotence that has a poor effect on tactics, anyway. Conceivably, there are warships on the far side of that planet. But if these softshells are just putting up a smudge with no claws behind it, we will gobble them up, and I will add an additional two *skrads* free pillage to what they have already earned. The Storehouse regions being off-limits, of course."

The aide beamed, and clashed his claws in anticipation.

Admiral Nade adjusted the screen to a larger magnification.

Elder Phillips formally shook hands with his son, Lance, who was dressed in battle armor, with sword and pistol, and a repeater slung across his back.

"Sorry, Dad," said the younger Phillips, "I couldn't take this mush-mouthed hypocrisy, that's all. It's a trap, and the fact that you and the rest of your generation let themselves get caught in it is no reason why *I* should."

Tight-lipped, the elder said nothing.

His son's lip curled. Then he shrugged. "Wish me luck, at least, Dad."

"Good luck, son." The elder began to say more, but caught himself.

A harsh voice boomed over the gathering.

"Those who have been found unsuitable for life on this planet, do now separate from those who will remain, and step forward to face each other in armed combat. Those who will do battle on the physical level, assemble by the sign of the sword. Those who will give battle on the level of tactics, assemble by the stacked arms. Those who will give battle on the plane of high strategy, assemble by the open book. You will now be matched one with another until but one champion remains in each group. Those champions will have earned the right to life, but must still prove themselves against an enemy of the race or of the Holy Word. In any case, settlement shall not be here amongst the scenes of your childhood. Let any who now have second thoughts speak out. Though a—"

A shrill voice interrupted. "Overthrow them! We have the guns!"

There was an instantaneous *crack!* One of the armored figures collapsed.

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The harsh voice went on, a little lower-pitched:

"Anyone else who wants to defy regulations is free to try. The punishment is instantaneous death. I was about to say that anyone who has second thoughts should speak out, though a courage test will be required to rejoin your family, and you must again submit to judgment later. The purpose of the Law is not to raise a race of cowards, but a race capable of controlling its warlike instincts. Naturally, anyone who backs out of *this,* and fails the courage test, will be summarily killed. Does anyone on mature consideration regret the stand he has taken?"

There was a silence.

The armored figures, their faces through the raised visors expressing surprise, glanced at the outstretched rebel, then at each other.

Elder Phillips's son turned, and his gaze sought out his father. He grinned and raised the naked sword in salute. The elder, startled, raised his hand. Now, what was that about?

"Very well," said the harsh voice. "Take your positions by your respective emblems."

Elder Phillips, watching, saw his son hesitate, and then walk toward the open book. The elder was surprised; after all, some fool might think him cowardly, not realizing the type of courage the test would involve.

The voice said, "After a brief prayer, we will begin . . ."

Arvast Nade glanced at the ranked screens in the master control room.

"There is no hidden force off that planet. It was a bluff." He activated his armored-suit communicator, and spoke briskly: "Turn the Fleet by divisions, and land in the preselected zones."

Hiram Wingate, Chief, War Prevention Department, watched the maneuver on the screen, turned to a slanting console bearing ranks of numbered levers and redly glowing lights, and methodically pulled down levers. The red lights winked off, to be replaced by green. On a second console, a corresponding number of blue lights went out, to be replaced by red.

Near the storage plant, huge camouflaged gates swung wide. An eager voice shouted over the communicator. "Men! Squadron A strikes the first blow! Follow me!"

Arvast Nade, just turning from the screen, jerked back to take another look.

Between his fleet and the planet, a swarm of blurs had materialized.

The things were visibly growing large on the screen, testifying to an incredible velocity.

Abruptly the blurred effect vanished, and he could see what appeared to be medium-sized scout ships, all bearing some kind of an-

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gular symbol that apparently served as a unit identification.

Now again they blurred.

Nade activated his suit communicator.

"Secondary batteries open fi—"

The deck jumped underfoot. A siren howled, changed pitch, then faded out. Across the control room, a pressure-monitor needle wound down around its dial, then the plastic cover of the instrument blew off.

The whole ship jumped.

A tinny voice spoke in Nade's ear. "Admiral, we are being attacked by small ships of the Storehousers!"

"Fire back!" shouted Nade.

"They're too fast, sir! Fire control can't keep up with them! *Look out!* HERE COMES—"

Nade raised his battle pincers.

Before him, the whole scene burst into one white-hot incandescence.

General Larssen, watching on the long-range pickup, sat in shock as glare from the viewer lit his face.

"And they don't believe in war! Look at *that!*"

"Sir," said a dazed subordinate, "That *isn't* war."

"It isn't? What do *you* call it?"

"Extermination, sir. Pest control. War assumes some degree of equality between opponents."

Lance Phillips, feeling dazed and drained, but with a small warm sense of achievement, straightened from the battle computer.

"I didn't do too badly?"

"Best of the lot," said the examiner cheerfully. "Your understanding of the geometrical aspects of space strategy is outstanding."

"I had a sense of drag—as if I couldn't get the most out of my forces."

"You didn't. You aren't dealing with pure abstract force, but with human beings. You made no allowance for that."

"But I did well enough to survive?"

"You did."

"What about the others?"

"They had their opportunity. Those who conquered will be saved. Any really outstanding fighters who lost because of bad luck, or superb opposition, will also be saved."

"We get a chance to do battle later?"

"Correct."

"We fight for our own planet?"

"That's right."

"But—how long since the planet was attacked?"

"Yesterday, when this trial began. Prior to that, not for about a hundred years."

"*Yesterday!* What are we doing here? We should—"

The examiner shook his head.

"The attack never amounted to anything. Just a fleet of lobsters wiped out in fifteen minutes."

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Lance Phillips looked quite dizzy.

"I thought we didn't believe in war!"

"Of course not," said the examiner. "War, of the usual kind, has a brutalizing effect. As likely as not, the best are sent to slaughter each other, so at least the physical level of the race is lowered. The conquered are plundered of the fruits of their labor, which is wrong, while the conquerors learn to expect progress by pillage instead of by work; they become a burden on everyone around them; *that* leads to a desire to exterminate them. The passions aroused do not end with the conflict, but go on to make more conflict. We *don't* believe in war. Unfortunately, not everyone is equally enlightened. Should we, because we recognize the truth, be at the mercy of every sword-rattler and egomaniac? Of course not. But how are we to avoid it? By simultaneously understanding the evils of war, and being prepared to wage it defensively on the greatest scale."

"But that's a contradiction! You can't distinguish between offensive and defensive weapons! And we have too small a planet to support a large-scale war!"

The examiner looked him over coolly.

"With due respect to your logic, your understanding is puny. Now, we have something here we call 'discipline.' Think carefully before you tell me again to my face that I am a fool, or a liar. I repeat, 'How do we avoid war? By simultaneously understanding the evils of war, and being prepared to wage it defensively on the greatest scale.' "

Lance Phillips felt the objections well up, felt the overpowering certainty, the determination to brush aside nonsense.

Simultaneously, he felt something else.

He opened his mouth. No words came out.

Could this be fear?

Not exactly.

What was it?

Suddenly he recognized it.

Caution.

Warily, he said, "In that case . . . ah . . . *how*—"

Iadrubel Vire scanned the fragmentary reports, and looked at Margash Grele. Grele's normally iridescent integument was a muddy gray.

"This is all?" said Vire.

"Yes, sir."

"No survivors?"

"Not one, so far as we know. It was a slaughter."

Vire sat back dazed. A whole battle fleet wiped out—just like that. This would alter the balance of force all along the frontier.

"What word from the Storehousers?"

"Nothing, sir."

"No demands?"

"Not a word."

"After a victory like this, they

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could—" He paused, frowning. They were *pacifists, who believed in self-defense.*

That sounded fine, in principle, but—how had they reduced it to practice? After all, they were only one planet. Their productive capacity and manpower did not begin to approach that of Crustax and—

Vire cut off that line of thought. *This* loss, with enough patience and craft, could be overcome. Two or three more like it would be the finish. There was just not enough potential gain to risk further attempts on that one little planet. He had probed the murk with a claw, and drawn back a stub. Best to avoid trouble while that grew back, and just keep away from the place in the future.

"Release the announcement," said Vire slowly, "that Fleet IV, on maneuvers, has been caught in a meteor storm of unparalleled intensity. Communications have been temporarily cut off, and there is concern at headquarters over the fate of the fleet. It will be some time before we will know with certainty what has happened, but it is feared that a serious disaster may have occurred. As this fleet is merely a reserve fleet on maneuvers in the region of the border with the Federation, with which we have friendly relations, this, of course, in no way imperils our defenses, but . . . h'm-m-m . . . we are deeply concerned for the crewmen and their loved ones."

Grele made swift notes, and looked up.

"Excellency, might it not be wise to let this information out by stages? First, the word of the meteor shower—but our experts doubt the accuracy of the report. Next, a substantiating report has come in. Then—"

"No, because in the event of a real meteor shower, we would make no immediate public announcements. We have to be liars in this, but let's keep it to the minimum."

Grele bowed respectfully, and went out.

"Damned gravitor," said Squadron A's 2nd-Flight leader over the communicator, "cut out just as we finished off the lobster fleet. I was signaling for assembly on my ship, and aimed to cut a little swath through crab-land before going home. Instead, we've been streaking off on our own for the last week, and provisions are slim on these little boats, I'll tell you that! *What* outfit did you say you are?"

The strange, roughly minnow-shaped ship, not a great deal bigger than the scout answered promptly:

"Interstellar Patrol. We have a few openings for recruits who can qualify. Plenty of chance for adventure, special training, top-grade weapons, good food, the pay's O.K., no bureaucrats to tangle things up. If you can qualify, it's a good outfit."

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"Interstellar Patrol, huh? Never heard of it. I was thinking of the Space Force."

"Well, you *could* come in that way. We get quite a few men from the Space Force. It's a fair outfit, but they have to kowtow to Planetary Development. Their weapons aren't up to ours; but, their training isn't so tough, either. They'd be *sure* to let you in, where we're a little more selective. You've got a point, all right. It would be a lot easier—if you want things easy."

"Well, I didn't mean—"

"We could shoot you supplies to last a couple of weeks, and *maybe* a Space Force ship will pick you up. If not, we could help—if we're still in the region. Of course, if not—"

The flight leader began to perspire.

"Listen, tell me a little more about this Interstellar Patrol."

Lance Phillips stared at rank on rank of mirrorlike glittering forms stretching off into the distance, and divided into sections by massive pillars that buttressed the ceiling.

"*This* is part of the storage plant?"

"It is. Naturally, foreigners know nothing of this, and our own people have little cause to learn the details. You say a small planet can't afford a large striking force. It can, *if* the force is accumulated slowly, and requires no maintenance whatever. Bear in mind, we make our living by *storing* goods, with no loss. How can there be *no* loss? Obviously, if, from the viewpoint of the observer, *no time passes for the stored object.*"

"How could that be unless the object were moving at near the velocity of light?"

"How does an object increase its speed to near the velocity of light?"

"It *accelerates.*"

The examiner nodded. "When you see much of this, you have a tendency to speculate. Now, we regularly add to our stock of fighting men and ships, and our ability to control the effects of time enables us to operate, from the observers viewpoint, either very slowly, or very fast. *How* is not in my department, and this knowledge is not handed out to satisfy curiosity. But—it's natural to speculate. The only way we know to slow time, from the observer's viewpoint, is to accelerate, and increase velocity to near the speed of light. A great ancient named Einstein said there is no way, without outside references, to distinguish the *force of gravity* from acceleration. So, I think some wizardry with gravitors is behind this." He looked thoughtfully at Lance Phillips. "The main thing is, you see what you have to know to be one of our apprentice strategists. We accumulate strength slowly, take the toughest, most generally uncivilizable of each generation, provided they have certain redeeming qualities.

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These are our fighting men. We take a few standard types of ships, improve them as time goes on, and when we are attacked, we accelerate our response, to strike with such speed that the enemy cannot react. We obliterate him. He, mortified, blames the defeat on something else. His fleet was caught in a nova, the gravitors got in resonating synchrony, *something* happened, but it didn't have anything to do with *us*. Nevertheless, he leaves us alone."

"Why not use our process to put his whole fleet in stasis, and use it as a warning?"

"*That* would be an insult he would have to respond to, and we are opposed to war. In the second place, we agreed to give you an opportunity to fight for the planet, and then live your life elsewhere. There has to be some outlet somewhere. We can't just keep stacking ships and warriors in here indefinitely."

"After we get out—*then* what happens?"

"It depends on circumstances. However, fighting men are in demand. If, say, a properly keyed signal cut power to the engines, and after some days of drifting, the warrior were offered the opportunity to enlist in some outfit that meets our standards—"

"Yes, that fits." He hesitated, then thrust out his jaw. "I know I'm not supposed to even think about this, but—"

The examiner looked wary: "Go ahead."

"With what we have here, we could rival the whole works—Federation, Crustax Empire—the lot. Well—why not? We could be the terror of all our opponents!"

The examiner shook his head in disgust.

"After what you've experienced, you can still ask *that*. Let's go at it from another direction. Consider what you know about the warlike character of our populace, and what we have to do to restrain it. Now, just ask yourself: What could such a stock as this be descended *from*?"

A great light seemed to dawn on Lance Phillips.

"You see," said the examiner, "we've already *done* that. We had to try something a little tougher." ■

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THE PICKLE BARREL

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There is a difference between taking care of every known hazard —and taking care of every hazard . . .

JACK WODHAMS

Illustrated by Leo Summers

Hollins temporarily closed communications with landside. "That's the decision. Are there any objections?" He quizzed his two companions.

They exchanged glances, looked back at him. "It's what we're here for," Chaz Arnsted said. "Everything is A-1 perfect. Conditions could never be better. We can't turn back now."

"Florry?"

Dr. Florry Lewis thumbed his jawline. "As Chaz says, it's what we're here for. Everything A-1." He mused. "Now *we* are the biggest question mark."

"We'll never be better equipped than we are now," Hollins said. "For us to fluff out might mean that the opportunity might never arise again. Naturally we can't duck, not really."

Arnsted grinned and shrugged. "We can't be afraid to start—not with all systems so beautifully on 'Go.' To make some excuse to abort would have us suddenly look gone gutless."

"Yes," Florry nodded, a trifle resignedly, "the hope and trust of millions behind us—not to mention the capital investment. To say 'No' at this stage, without a so-called *valid* reason, would be to ask for latrine duty for the rest of our lives. But," and he frowned down out the window, "up here, with the break now imminent, some realization of the magnitude of what we're being asked to do is sinking in."

"It should be no worse than doing a tour in the Arctic, or upon some remote weather station some place." Hollins checked the countdown as landside paced their orbit. "Fine, everything is fine. We have no choice but to confirm." He did not sound unhappy. His gaze upon Florry held faint challenge. "In less than an hour now we shall reach the point of no return."

Dr. Florry Lewis acceded to the seeming inevitable. In some vague way he had not expected everything to go so well. Of course, he had been prepared, but . . . he still had misgivings—as any sane person would have at the outset of

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such a wildly improbable venture.

They burnt their bridges, crossed their Rubicon, cut off their own retreat. They used precious fuel to swing them out and away, to send them on a long, long journey to carry out a manned survey of Mars.

Much had been built into the craft to alleviate the tedium of interminable travel through emptiness. Apart from fulfilling regular and demanding duties to satisfy home base, the crew took study subjects of their choice. They had films, music, standard entertainments, canned or direct from home. And among other items they had a diverting construction kit of sprung parts that could be played or made with great variety—a thousand-and-one-things for a boy to do.

Their living quarters were "unfinished," were designed to give them occupation and scope for individual fashioning in the arrangement and styling of light and malleable materials. They each had one hundred cubic meters of space, a third of which was private. For at least one hour in every twenty-four they were obliged to use the facilities of the "gym" to register their endeavors through Muntelsen's special regimen of weightless calisthenics.

Yet despite the best efforts of the planners to maximize the facilities in the space available, three hundred cubic meters of room became very cramped after a while.

Hollins counted, ". . . Three . . . two . . . one . . ." his scriber ticked at the last second, "Zero!" He stuck the pen to its holder. "*One month.*" He gave a hip-twist against his straps to swivel his seat about. "Only another fifteen more to go, Florry."

Florry made uncheering reply. "If we can last that long. Lief, I don't like this creeping rise in the acetose level. It looks nothing much, but I still can't trace the source and we're not getting it under control."

"We're cycling it out, aren't we? Don't tell me you're worried about shortage already."

"There's a limit to our reserves and we've been drawing on them too heavily. We've got a long way to go still, and there are other flaws in our ecosystem that begin to bother me."

"Florry, you're beginning to repeat yourself. We've discussed this before, and I see no reason to change our position. The journey out is more important than the journey back. We will use up all the pure reserve if need be to ensure the best chance of keeping us in good shape to arrive. Coming back we can run through it all again. I don't see us meeting any serious trouble, nothing we can't handle."

"No, I don't suppose you can."

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"Florry," Hollins's tone had sharpness, "we have been equipped, thoroughly equipped, to take countermeasures against any contingency that might arise. A completely fresh atmosphere every two weeks till we get there, and a complete change of water every week. If we want to step up this rate, we can. I can see no reason at all for your pessimism."

"We don't have fresh pipes and taps, fresh tables, fresh eating ware, fresh paint work. Refreshing part does not refresh the whole."

"Florry, what do you expect? For God's sake stop persisting with your gloomy forecasts. We've been fine so far, and I intend that we shall stay that way. Just concentrate on your job, Florry, huh?" And now he sounded a mite plaintive. "And stop trying to raise specters."

Florry was getting more and more disposed to thinking that there were none so deaf as those who did not want to hear.

Three was a crowd. Often two was a crowd. Dr. Florry Lewis, as a semi-civilian, did his not-too successful best to overcome this disadvantage. All three were trained and very conscious of the need to practice tolerance. They needed all the forebearance they could muster so they saw less of each other whenever they had the choice.

Where he was not overruled, Florry's stipulations for conservation and usage were largely obeyed. His diets were adhered to, and the medicines he issued were religiously taken. It was his concern to see that they balanced activity and sleep. Unavoidably he was at times a nuisance with his insistences.

"Everything else is working fine, so why do you have to be a Jeremiah harping on our prospects of doom all the time?"

"This is the sixth time Chaz has got sick, and you're off-color again yourself. It's occurring with greater frequency."

"We're beating it, aren't we?" Hollins said. "There's plenty of medicine left in the cabinet yet, isn't there?"

"At our present rate of usage to combat anticipated woes—yes, more than adequate. But should there be a markedly increased demand in greater variety, then we could find ourselves in difficulty."

"But is that likely? It's been nearly four months now, and by my reckoning we're not doing too badly at all."

"You don't seem to understand. You're switching in the new reserves too prematurely. Necessarily there's an overlap in the substitution, and we're not managing to leech out the CO content to an entirely satisfactory degree. Also we're not bleeding off static as we should, and I begin to suspect that we might be getting mild but un-

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wanted reactions from this phenomenon."

"All right, Florry, all right, so you've told us. We can't help it very much, can we? If we stay longer with the stale this time it *might* not be healthy, so why do it yet? We can build our immunity later if we have to—that's what the big kit is for. We want to be fit when we come to make the Mars loop. If we *are* to suffer, we can do it after we turn for home, where if need be we can lock on the automatic."

Florry annoyed with his chin-fondling habit: "I don't like it. We should be putting our resistance to the test now. At the rate we're using it up, we won't have a whiff of fresh left after Mars. And it's in the later stages that we'll be needing it most."

"Florry, our retrieval system will take care of that—theoretically we should need nothing else."

"Oh, yes," Florry scoffed, "theoretically. That's why they gave us such generous basic reserves to alternate in the first place."

"That will be all, Dr. Lewis," Hollins snapped. And this adoption of curt formality was recognized warning, and closed the conversation.

"I don't know what it is," Florry said. "Could be fungus, could be some kind of bacteria. Whatever it is, it seems to be specific to something in the fibric."

Arnsted's nostrils dilated. "Haven't we anything to kill it off?"

"You don't listen to me, do you? I keep trying to explain the total impossibility of maintaining a sealed ecological balance over a prolonged period. Absolute sterility cannot be achieved, and we ourselves are just crawling with symbiotes that could go haywire if triggered by a bad upset."

"You give me a pain, Lewis," Arnsted said loudly. For the past couple months the two had been seeing as little of each other as possible, literally looking the other *way if it could be managed.* "You're always crabbing and never doing."

"Oh yes? If I wasn't doing, we'd all have been dead long since. I know you—you'd use some gunk to clean up the fibric, and so add more noxious fumes to our atmosphere."

"It couldn't be much worse than the queer smell it's got—it's like cheese."

"As far as I can tell, it is not injurious to health," Florry said. "On the other hand it's not wanted and we need to get rid of it—but not by methods which release toxic substances into our air."

"What's your purifying system for if it doesn't purify?" Arnsted shouted. "You're always making excuses. Excuses, excuses!"

"There's more to maintaining an environmental balance than run-

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ning a few trays of hydroculture and keeping a pet goldfish," Florry answered stiffly. "Which means that here, right here, we only have a mere fraction of everything. We have too much and a preponderance of some things that we don't want, and more and more we are sadly missing so many things that we don't have."

"But," Arnsted's fists clenched, "we can't do anything about it, can we? We have to make do, do the best we can. It's your job!"

"Oh yes, I've had a free hand, no interference." Florry was sarcastic. "Even a spanking clean changeover doesn't do much good now. Can you remember how clean and crisp this scow was when we started? Since then practically every agent used attempting to keep her that way has added its own effluvia, and its combined reactive effluvia, to linger resistant to tanking. No matter how hard we try, our atmosphere steadily is becoming more dominated by those ingredients most resistant to extraction and purification."

"It hasn't killed us yet," Arnsted snarled.

"Give it time," Florry promised. "This vessel is a stagnant pool, filtrated ever more perniciously by the accumulation of contaminant juices."

"What can we do about it then?" Arnsted cried, losing his patience. "We've got to go on, and on, and on. Do you have to keep telling us that we're going to eventually choke on our own poison?"

"Would you rather not know?" Florry asked.

"Yes!" Arnsted spat. "I'd rather not know!"

Florry scowled and averted his face, and kicked himself off to his own quarters.

They hated each other's guts. They lived like monks now, were jealous for their privacy. Claustrophobia in a void. Each with a ritual, a defined territory. Duties designated to an exactness of responsibility, timing so very important.

As medic, Florry held sick parade twice every twenty-four hours.

"If you didn't have it yourself, I'd say you were doing it on purpose," Hollins said bitterly.

"You're not feeling any better?" Florry looked as sallowly jaundiced as his patient.

"No—are you?" Hollins jibed. "Physician cure thyself." Gingerly he straightened his legs. "You've got to do something—I've only got to *think* about moving faster and the cramps get me." He exploded, "There must be something in the chest to fix a simple thing like this."

"It's not a simple thing." Florry had grown coolly dispassionate with the passage of time. "The answer that came through from base appears to have been no more reliable than their cure for our brand

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of diarrhea. Did the green pills give you any relief, by the way?"

"Partially," Hollins admitted. "But now I've got this rash around my neck and around my stomach. It can't be blasted measles—I had them when I was a toddler."

"Open up and let's have a look," Florry said professionally.

Hollins complied irritably. He had lost a lot of faith in his medical man, but he was too far removed from alternatives to seek to change. "You've got to get us fit, Florry," he growled. "In another week we'll be on top of Mars. At all costs we've got to be in maximum shape to handle that twist and traverse. If we foul up, I'll never forgive you . . ."

"We've been lucky not to have something like this happen sooner."

"What is it?"

The approach and surveillance of Mars had occupied them, uplifted them with a renewed sense of usefulness and vitality. Their contact with home base had shown a marked upcurve in enthusiasm and duration, and they had tackled their programmed tasks meticulously and right on schedule.

For a while it had been quite like old times, and the grinding dreariness of the past months had magically fallen away. They'd had something to do, their job, their tremendous reward for their stolid and enduring patience. Sickness and travail had become of no moment.

Now there was anticlimax. Mars was receding. It was over. The sustaining anticipation and eagerness was all used up and the long, long voyage home stretched with unattractive bleakness before them.

"I don't know what it is," Florry said. "It could be a deficiency, but it's more probably an unwanted additive."

Hollins studied the radach leaves, poking to rub at the pale copper veins. "Is it still edible?"

"I can detect nothing harmful," Florry admitted, "but it's obviously different. Some ingredient has changed its structure."

"And you don't know what it might be?"

"It could be anything. We're starting to go through our reserves for the second time, and no matter how we try, we can't get our recycling equipment to better than ninety-eight percent proficiency."

Florry picked up a leaf to twiddle. "Natural counterbalance is absent. There is an interdependence between the needs of humans and the needs of the things that humans need. We share and need a common environment. We cannot emulate the vast entirety of terrestrial resource in a compartment no bigger than a trailer. The winds, the waters, the enormous diversity—we can contain but a fraction. And in this fraction we contain there is part that hungers for what is absent, and the other part

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which is overloaded by the proliferation of certain commodities normally dispersed and subdued by alternative absorption processes."

Hollins fidgeted. "All right, all right, so you've told us."

"I have." Florry was not of a mind to self-deprecation. "Everything becomes affected, one to another, from our ingenious microbiological purifiers, through our salad box, and so up through to ourselves. Uncomplicated organisms can adjust and adapt, like these leaves. But we are more complex, and we're less able to modify rapidly to insidiously deteriorating circumstances."

"Well," Hollins shoved the vegetable aside, "we can do without it. It was only meant to supplement our diet. We've got plenty of hydrate left."

"I disagree," Florry said. "Anything that diminishes the variety in our intake is to be avoided."

"God alone knows that all our food seems to taste the same anyway," Hollins grumbled. "Don't give us a lecture on your parallels with scurvy and other ailments peculiar to isolated ancient mariners."

"The parallel is there," Florry asserted. "We're not on salt pork and ships biscuit, but we have the monotony of a latter-day equivalent. Everything starts to taste the same because, no matter how clear and seemingly aerated, our water supply is acquiring an ineradicable taint. And it will get worse."

"Thanks," Hollins grated, "for letting us know."

They did not know what they looked like. That is, they were not conscious of the steady change in each other. Sallow to gray, figures trimming from lean to gaunt. Some carelessness in dress and tidying of beards.

The struggle to live now became most acute. The interflow between base and ship became almost entirely devoted to medical enumeration and diagnoses. Specialists and experts mooted answers to the problems, answers that calculably raised other problems. Much sweat, much brainwork, the questions became more involved and devious, the suggestions to correction became more ingenious and sophisticated.

"We're fine, fine, O.K., fine." Arnsted slammed the microphone back into its socket, "just fine!" He glared at Hollins. "Who do we think we're kidding, huh?" He shivered. "*We* know it's a front, and *they* know it's a front, yet we still sign off happy happy as though everything is running smoothly."

"Everything is running smoothly. We're turning in a copybook operation, navigationally on the button, a sweet performance." Hollins was chagrined. "But *we* are going to pieces. My eyes keep going funny, and my fingers sometimes feel like bananas."

"It's *his* fault," Arnsted mut-

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tered. "He should have spotted that blown gasket in the number four filtrator long ago. And he's not handling the distillation properly."

"He's doing his best," Hollins temporized grudgingly. "The way his hands and feet have swollen up it's a wonder he can do anything."

"That's right, defend him," Arnsted chafed. "You're on his side. You've been on his side right from the start. Well, he's an incompetent, and he's a Jonah, and he's killing us!"

Hollins grabbed his arm. "Shut up!" He pushed. "Now listen, Chaz—we've got enough troubles. You think you can do his job better, huh? You want to take it on?" He snorted. "I think no more of his ability than I think of yours—but in this situation he's all we've got. *I* need him if you don't."

Arnsted was jumpy with frustration. "It's all right for them at home to theorize. Counteractants," he jeered, "muck! Injections, injections—what good do they do?"

"Some, we can hope. We'd probably be worse off without them."

Arnsted sneered his contempt and swung away. "Muck! It's all muck!"

"We've got used to it," Florry said. "It's amazing how the senses become dulled by constancy in excess. But the olfactometer registers higher every day. This vessel is becoming worse than a sewer. From the water to the food to the air, we just can't get rid of it, or stop its sure increase."

"We're surviving," Hollins said doggedly. "So we're living in a pigsty. If we can't beat them then we have to join them, right?" His face had some long-absent color, and he seemed to be just a little bit drunk.

"We must do our best to adapt ourselves to prevailing conditions, yes," Florry agreed, "even if it means taking poisons to combat the poisons. Our organs need all the assistance they can get."

"Exactly," Hollins concurred. "We mustn't give up too easily."

"No. This latest prescription seems the best so far."

"It does, it does," Hollins nodded. "I feel better. Not a hundred percent, but better than for a long time. Headache's mostly gone, can do most of the exercises again, I . . . I feel a lot better."

"Gums still sore?"

"Not so bad, not so bad. But Florry, I've . . . we've got a bit of hope back, haven't we?"

Florry scratched into his beard. "Specific causes can give rise to specific cures. The impurities after all cover a very narrow range. Giving the pertinent organs some booster assistance to cope with is not too difficult after all. I mean, we can be fairly sure by now of the disease dangers that *don't* exist on board, and this gives us at least *some* latitude to manipulate the metabolism."

"Uhuh." Hollins frowned.

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"Halfway home. We've got to last out. How are the reserves holding?"

Florry became grave. "We'll start going through for the third time in another eighty hours. If we can again make each batch last a week before going on to the next, it should be just enough to get us home . . ."

Chaz Arnsted began to hallucinate badly, thinking himself swimming in the sea, or skiing, or dangling from a parachute seeing land swinging below. He became hard to reach. His reaction to treatment was different from that of the other two, who seemed to enjoy a certain mutuality in physical symptoms and response.

Florry sweated and labored, himself suffering from double-vision much of the time. Test advice for remedies continued to flow in from base.

The ship was tuned and fully relinquished to be brought in by ground control. The crew concentrated on keeping themselves alive. Stale air and water cycled through the purifying system for a total of four weeks were replaced by stale air and water that had only been cycled through the purifying system for three weeks. This "fresh" air always smelled good, and the change-over was a welcome weekly event.

Florry ignored the olfactometer these days—he was sure that it was not working properly anyway. They were growing no green plants now, their aqua-culture providing them cress of a grown black variety, or radach and suchlike of an autumnal-colored foliage. Despite this the salad was eaten for its neutral flavor, to meagerly offset the deadly menu of prefabrications. And the menu of pills and shots to help them fight and enable them to live with their tight and exclusive environment.

It was an uphill battle of trial and error.

Two weeks from home.

It didn't seem possible. Arnsted was up and about again, and now somewhat on the defensive over the embarrassment of his lapse. Their spirits were reviving. They had been through hell and had feared the worst. Had *lived* in hell. *Were* living in hell.

"I wouldn't have believed it," Hollins said. "Not even a couple of weeks ago. Modern science, modern medicine—given time they can crack any problem. These last few days I've felt great, absolutely great."

"Without question the nearness of home has helped," Florry allowed, "but there can be no doubt but that we've struck the right combination to counter the debilitating effects of the bulk of noxious substances ingested. My bodily tone has improved almost to what I might consider normal."

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"Well, I haven't felt so good in weeks," Hollins confessed. "In months. Not since we left. And maybe Mars." He wiped at his mouth with both hands, stroked brusquely at his short beard. "A month ago I'd have said we weren't going to make it—but now I think we might be able to take a hand in bringing her in."

"I don't see why not." Florry was uncharacteristically optimistic. "We seem to have the problem licked—or at least well under control. It's been a frightening challenge, and I must admit that I've been very much afraid that we wouldn't win through."

"And you think we might now?" Hollins's mood was cordial.

"I think so. I think we've mastered this environment. The weeks remaining should see us strengthening this ascendancy rather than losing it again."

"We're not likely to be hit by another type of sickness you think?"

"With luck, no. At least, nothing drastic. We seem at last to have become acclimatized to what there is. A body either recovers, or it does not. If it recovers, it generally signifies that the body has developed a fair measure of immunity."

"Thank God." Hollins held his own rib cage and took a deep breath. "It's been hell, Florry, absolute hell." Now he smacked his palms together. "Two more weeks. They're going to drag. I feel like a kid itching for Christmas . . ."

The Earth getting bigger—oh bless you, baby! So lovely. It made the mouth dry, numbed the mind to just looking. Home, going home—it made the heart ache, hanging there, gradually, so gradually growing, causing the throat to constrict uncontrollably, the limbs to tremble in fondness of longing. Earth enormous, beautiful, unbelievable, so lovely and desirable as to be frightening in its massive meaning of home.

It had been so long, they had been away so long. The folk down there had ridden with them, followed them all the way, had looked and listened and sympathized and helped. They had been away too long, far too long. It was good to be back, so incredible to be back, so fantastic to be back.

The communications channels were jammed. But care, care! No mistakes, not *now*, easy. Easy, boy, easy, not a chance of a slip, bring her home, bring her home.

Perfect. To Mars and back. Functionally perfect, one hundred percent. A beautiful piece of work.

There was a rush to be at the opening of the doors of the sealed craft, to see and be near these three tough and hardy adventurers. And the trio of intrepid explorers were no less eager to escape their cage and set foot once more upon Earth. It was a poignant, highly-charged moment.

The willing hands of a number

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of privileged servicemen assisted at the opening of the doors. And briefly the travelers were seen framed in the doorway. Then the nearest servicemen reeled back, fending, covering their faces, swerving away from the awful reeking stench that issued from the returned vehicle.

The three voyagers tottered out and forward, and as they breathed the tangy air that breezed in off the sea, their faces squinched. They found themselves gasping, their breathing apparatus having become totally unaccustomed to dealing with such a disparate quality. This ocean air was an alien substance, and the shock to their drug-suppressed, modified and hybridized lung tissue was tremendous.

They died, of course. ■

DEADLY POISON Water is poisonous to all mammals. Oxygen is corrosive-destructive to mammalian lung tissues. Quite a number of children have been killed by swallowing iron compounds. Less than a gram of vitamin A or D is lethal.

Arsenic and strychnine are excellent tonics.

Recently, it's been discovered that selenium—long known as a violently toxic material—is essential to mammalian life. "White muscle disease" of cattle, sheep and horses turns out to be a selenium-deficiency disease; selenium has been found to cure muscular dystrophy in some animal experiments.

Potassium chloride is essential in human metabolism. An injection of potassium chloride can cause almost instant death, and leave no trace of the cause of death.

In each case, it's not a matter of *what* alone, but of *how much*, and *in what period of time*. Of course mammals drown if water gets into the lungs; however, water is a true poison, if simply ingested in too great quantity. Too much water dilutes the ionic analysis of the blood below the livable level, and causes death. Oxygen, pure and under high pressure, produces oxygen pneumonia; remember that while we're adapted to an oxygen atmosphere, there are limits to any adaptation—and of all the elements in the universe, only fluorine is more corrosive than oxygen.

And while we need iron in our blood—as we need vitamins—again there are limits. Iron isn't ordinarily considered toxic, but children have got into Mama's iron pills and swallowed a quantity of them as to be fatal.

The rash of crepe-hanging that took off on the toxic properties of the pesticides—the Silent Spring Syndrome—centers around the muddy thinking that says "if a thing can be lethal, then that thing is a deadly poison."

Can you name anything that can't be lethal under *any* circumstances?

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P. Schuyler Miller

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THE SF CINEMA

Recently the Kubrick-Clarke "2001" made its third long pass through Pittsburgh; it hasn't reached the neighborhood theaters and drive-ins as yet, though it may have in your town. Would you believe that it was released nearly three years ago?

"2001" and to a degree "Planet of the Apes" suggest that maybe, after all these many years, producers and directors are willing to meet science fiction on its own ground, as they have only rarely done detective stories in even more years. ("Beneath the Planet of the Apes" is pure regression! "Marooned," which I haven't seen, was a runner-up for a Hugo award at last summer's World Science Fiction Convention in Heidelberg.)

You may recall that a few years ago Susan Sontag, self-proclaimed High Priestess of the New York intelligentsia, proclaimed Japanese monster flicks as the highest of High Camp. Most of us turned pale and started growing beards to mutter into. But in spite of this intellectual acceptance, SF films have been hard to find. They've turned up, with no reviews and little promotion, in Saturday afternoon popcorn fests and drive-in wrestling pits—usually under a changed name, so that if you had discovered somehow (usually through a fanzine) that "X" is a good job, it shows in your town as "Y."

Last April, in *Show*, Harlan Ellison did a good, if short and abnormally subdued appreciation of SF films. Maybe you saw it. But the best survey of the field that I have seen is a British paperback, "Science Fiction in the Cinema" by one John Baxter. It has been published in the United States by A. S. Barnes & Co. of New York (240 pages for $2.45), and it covers science-fiction films from Georges Melies's "A Trip to the Moon" in 1902 to 1969, closing with a "select filmography" of thirty pages. Baxter, whoever he may be, has apparently done another book on horror films which I'd dearly love to see. I suspect it should be read as a companion to this one, but Ivan Butler's "Horror in the Cinema," in the same pb series, is rather feeble stuff compared with Baxter's study.

One thing that appalled me is the number of good SF films that I had never even heard of. I have learned since coming to Pittsburgh that a good-sized city sees fewer films than a small town. "Big" pictures run for weeks, even in the neighborhood houses, whereas minor films drop into an obscure spot or a drive-in for a couple of days

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at most. I am equally disconsolate over the number of good films that I passed up because I thought they were tedious trash, or because their names had been changed to something that made them sound like trash.

Baxter is a film buff, not a science-fiction fan. He judges pictures as examples of cinema-making technique, not as good SF or even good acting. Some classics—for example, "Frankenstein" and "King Kong"—he classifies as horror films. (My conclusion that he has written elsewhere on that genre is based on the way in which he repeatedly refers to techniques developed by directors and producers of horror films, and which are employed in the science-fiction films he is discussing.)

Baxter's basic contention is that science-fiction films are an outgrowth of SF cartoon strips such as "Flash Gordon" and "Buck Rogers" than a straightforward application of cinematic techniques to good science fiction, or use of good SF themes by competent producers and directors. In other words, it is a genre in itself and should be evaluated as such.

"Unlike the Western," he says, "it has never achieved a sufficiently large audience to rate serious study. Film-goers reject it because its visual conventions are often crude and unformed. Science-fiction readers likewise reject it because its plots are tawdry." I'd like to quote more from this introductory chapter, but it wouldn't be fair to the author or publisher; read the book for yourself. I think he might also have said—and maybe he does, on a page I neglected to note—that ordinary film-goers simply can't understand what is going on in a SF film that is produced like a SF story. Check the reaction to "2001"—some of the comments reprinted in the massively disorderly paperback edited by James Agel, "The Making of Kubrick's 2001" (Signet Books No. W- 4205; 368 pp. and lots of illustrations for $1.50), for example. And SF readers can't help squirm when they see what a director does to elementary logic—like scrambling half of New York into one subway station in "Beneath the Planet of the Apes."

Probably, unless you are a film buff, you've never bothered about how a good SF film is made. Baxter's little book takes them apart and shows you how it's done—at least, how a few directors and producers have done it, and others haven't. If anyone—Forrest Ackerman ideally, I suppose, but maybe the new Science Fiction Research Association—undertakes to assemble a library of memorable science-fiction films, I hope they let John Baxter help with the selections and program notes.

THE 1970 "HUGOS"

Shortly after the January department went into the mail, Guy Lil-

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lian III of the New Orleans Science Fiction Association came through with the results of the Hugo awards, cabled from Heidelberg by author Daniel F. Galouye. I believe the New Orleans newsletter, *Nosfan 9*, was in the mail on the day of the Heicon (taking advantage of the time differential). Not long after, in his *Locus 62*, Bronx fan Charlie Brown added the names of the runners-up. This report combines the news from both sources.

Two winners of the Science Fiction Writers of America's "Nebula" awards also won Hugos: Ursula K. Le Guin's novel, "The Left Hand of Darkness," and Samuel R. Delany's "Time Considered as a Helix of Semi-Precious Stones." The Delany story was considered a novelette by the SFWA, a short story by the Worldcon. No matter; it was extraordinary, as was the Le Guin novel.

Fritz Leiber took the novella award for his "Ship of Shadows," a far better story than the ones which have earned him Hugos before. Harlan Ellison's Nebula winner, "A Boy and His Dog," came second according to Charlie Brown. Robert Silverberg's "Passengers," Nebula short story winner, placed second to Delany.

John Campbell accepted a Hugo for Kelly Freas as best professional artist. (Analog came second to *F&SF* as best magazine of the year.) A special dramatic award went to NASA for the Apollo XI moonwalk coverage. *SF Review* was considered best fanzine, with Charlie Brown second. First Fandom, the "those were the days" organization, made a special award to Virgil Finlay.

John Campbell may comment directly on the first World SF Convention to be held outside the English-speaking world—England has had it twice and Toronto once. There may be an annual European convention in addition to the English one at Easter time, and there will certainly be more active bidding for a place in the World circuit. Sweden is likely to be next.

Guy Lillian also reports that Doubleday will publish another collection of Hugo-winning short fiction, "The Hugo Winners—II." It may be out before you see this. It is supposed to include the winning novellas, novelettes and shorts since 1963, except for the Brian Aldiss "Hothouse" series, which were collected as "The Long Afternoon of Earth."

Other contenders? Robert Silverberg's "Up the Line" and Kurt Vonnegut's borderline "Slaughterhouse Five" were also Nebula runners-up as novels; Piers Anthony's "Macroscope" and Norman Spinrad's "Bug Jack Barron" also got into the top five. Anne McCaffrey's "Dramatic Mission," which originated here in Analog, and Robert Silverberg's "To Jorslem" were both Nebula contenders and both

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are parts of since-published books. James Blish moved into the finals with "We All Die Naked." In the shortstory field, Ursula LeGuin reached the play-offs with "Winter's King" and Greg Benford with "Deeper Than the Darkness;" Larry Niven's "Not Long Before the End" was also a Nebula contender.

"Marooned" and "The Illustrated Man," which I haven't seen, were runners-up for the drama award, as were two (English?) films or TV programs, "The Immortal" and "Bed Sittingroom." *Amazing*, *Galaxy* and *New Worlds* got into the "Best Magazine" finals.

Hugo awards also go to the best fan writer and artist, but we don't have a fanzine department here and space is short. Sorry—and thanks to fans Lillian and Brown.

TIME AND AGAIN

By Jack Finney • Simon and Schuster, New York • 1970 • 399 pp. • $7.95

This pretentious and expensive tome—to which *Life* has given a full-page accolade—is typical and pretty good *Saturday Evening Post* or *Colliers* SF. Only there is no *SEP* or *Colliers* to publish it.

It's a time-travel story in which our hero, in the service of a secret government project, is convinced that all he has to do is believe he is living in another place and time, and vroom!, he'll be there. He can of course, carry girls with him.

It is also a gimmick book, and that accounts for the price. You see, commercial artist Si Morley is sent back to Old New York of 1882. He does a lot of sketching—in a variety of styles—and he borrows a camera—which sometimes uses film, sometimes dry plates—and takes a lot of photos. These are used to illustrate his adventures.

Said adventures are right out of an 1882 melodrama, except that Jack Finney is by no means an 1882 writer and Si Morley is a strictly 1969 New Yorker. He does a Twentieth Century girl friend the favor of checking to see who mailed a letter which caused her ancestor to commit suicide years later. That takes him to a surprisingly modern young lady, whose photo is on the jacket flap, and who looks very much unlike herself in Si's pencil sketch on page 213. Her would-be fiancé turns out to be the blackmailing letter writer, and some clumsy sleuthing, combined with a running tour guide as Si and Julia wander around New York, leads them to participation in the terrible World Building fire.

Then, as you know if you read the *Life* review, the Pentagon and White House decide it would be nice if Si were to go back and change history just a little, to eliminate certain embarrassing events. Nothing so gauche as assassinating Joseph Kennedy—or maybe it would have been his father—but

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just a little temporal blackmail of his own.

The rationale that bothered *Life* should be clear enough to any veteran of SF, though. If all times and places are coexistent in the cosmic continuum, all you have to do is convince yourself that you're at place/time B instead of at A—and there you are. Everybody's done it, but nobody else was in love with New York in 1882.

THE ORGAN BANK FARM

By John Boyd • Weybright & Talley, New York • 1970 • 260 pp. • $5.95

Barring further miracles, here is my candidate for best novel of 1970. I don't know whether "John Boyd"—it's a semi-pseudonym—is, or intends to be, a member of the Science Fiction Writers of America, but he deserves a Nebula, member or not. The fans may not give him a Hugo unless the book is out in paperback by voting time, but dammit, they should!

Needless to say, this is totally unlike any of Mr. Boyd's other four books. (His jacket artist, Paul Lehr, has changed his style too, and I prefer the old one.) No rider of the "new wave" could ask for a book that probes deeper into "inner space" than this story of how Dr. James Galway, sometime wizard neurosurgeon, sometime virologist, now a Pavlovian child psychologist, struggles to bring a group of autistic children out of their mental prisons—and falls in love with one of them. No lover of strong plots could be disappointed by this story of a vicious secret project of the Department of Health, Education and Welfare, which has assembled a valley full of mental and physical misfits who will be cold-bloodedly cut up to provide spare parts of the fragment of the Establishment that has survived a bacteriological holocaust. There is even a strong seasoning of wholesome sex, for—though no Freudian—Dr. Galway is not one to neglect possible therapeutic channels.

If you have read any of John Boyd's other books, you know that he puts real people into them, that he has a rich and freewheeling imagination, and that he takes care to understand the science he is using. This is a book that will turn up something new every time you reread it—and I feel certain people will be rereading it for a long time to come.

AND CHAOS DIED

By Joanna Russ • Ace Books, New York • No. 02268 • 189 pp. • 75c

This Ace Science Fiction Special is definitely that. It is also totally unlike the author's previous Special, "Picnic on Paradise."

Jai Vedh, youngish, bland, unhappy, a passenger en route from Old Earth to somewhere unimportant, finds himself one of the survivors of a spacewreck. The planet

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where he and the ship's captain find themselves is one where a human colony had been planted centuries or even millennia before, then forgotten. Over the years it has evolved its psionic powers, then evolved a society to fit the new breed of men. In that society the interlopers, the captain in particular, are a distinctly sour note.

I can't say much more about what this world and its people are like, or how they change Jai—and fail to change the captain—because that is the story. This is definitely one of those "theme as hero" stories that are peculiar to science fiction—except that the people of the story aren't scamped either. I can't think of any book which gives you the *feel* of telepathy, clairvoyance, and the other psi phenomena so *well, but that's not a very original* observation, since Fritz Leiber, Samuel Delany and Robert Silverberg say the same thing on the cover. Bob Silverberg calls it "a Trip" rather than a novel. He can have the last word.

SF PUBLISHED IN 1969

Joanna Burger, 55 Blue Bonnet Ct., • Lake Jackson, Texas 77566 • 55 pages • 75¢

A must for all science fiction collectors and bibliographers. Miss Burger took on this annual listing of science fiction books two years ago, and with the help of other fans is making it amazingly complete. It covers both paperbacks and hardbacks, fantasy as well as science fiction, with a good many related books—e.g. on science fiction films, critical essays, et cetera.

The first and complete listing is by title. This is followed by an author listing by senior author, and that by a highly useful compilation of series books.

The 1967 and '68 compilations are out of print, but dealers may have them. Miss Burger intends to keep them up until she gets tired or diverted to less time-consuming hobbies.

THE ASIMOV SCIENCE FICTION BIBLIOGRAPHY

Compiled by M. B. Tepper • The Author • 535 Ocean Avenue, Santa Monica, California 90402 • 50¢ + 25¢ postage/handling

You should know by now that I am a sucker for bibliographical publications by fans. They are useful; they represent a hellish amount of work; and they deserve recognition. This is the first of a series of bibliographies that Tepper hopes to publish if he gets encouragement. Books on Van Vogt and Clarke are in the works.

You will also note that this is strictly a science-fiction bibliography. Unlike the listing that Tasmanian fan Donald H. Tuck published in 1960 (I don't know whether he has updated it since), Tepper's booklet does not attempt to include Dr. Asimov's many articles or non-fiction books. It does

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have a play that Tuck missed and a comic strip continuity too recent for the previous bibliography.

Tepper's organization is unorthodox. The organization is categorical and chronological. The first section is a listing of published books, beginning with "Pebble in the Sky" in 1951, and including tables of contents—even chapter headings for the novels. For the short story collections, you are told *when* each story was first published, but to find out *where* you have to turn to another section, a year-by-year published fiction listing. This does include appearances in anthologies, but only in hardbacks and original paperbacks. Paperback editions of Dr. Asimov's books aren't listed at all, and you don't get the English editions which Tuck had for the pre-1960 period.

Verdict: it's a good job as far as it goes—one I'd never have taken on—but it could be more complete and more useful.

NEW EDITIONS OF CLARKE

The success of "2001" has persuaded his American publishers, Harcourt, Brace and World, that it is high time his books were back in print so that libraries can have them and new readers discover them. They have begun with four "2001" editions—new jackets, new introductions, new prices—one "documentary" novel and his first three collections of short stories.

REACH FOR TOMORROW

By Arthur C. Clarke (178 pp.; $5.75)

Twelve stories, including some remarkable predictions.

PRELUDE TO SPACE

By Arthur C. Clarke (209 pp.; $5.75)

Clarke wrote this book as a student, in 1947. It describes the building of the space station which is important in "2001," and its use to reach the Moon—in 1959. He has not changed the book, though fact outran fancy and followed a different course.

EXPEDITION TO EARTH

By Arthur C. Clarke (181 pp.; $5.75)

Eleven short stories—his first collection—including "The Sentinel," the story which contained the germ of "2001."

TALES FROM THE WHITE HART

By Arthur C. Clarke (179 pp.; $5.75)

Clarke fans remember this book with a great deal of affection. The yarns are spun by Harry Purvis, drinking with his pals in a London pub just as the English SF crowd did—and do. There are traces of Lord Dunsany's friend, Mr. Joseph Jorkens, and of other memorable yarn spinners through the centuries, but the stories are pure Clarke. This is the first U.S. hardbound edition.

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BRASS TACKS

Dear John:

I am interested, for professional reasons, in locating one or more groups of original letters by Howard Phillips Lovecraft.

I have reason to think that these letters have passed through several hands since originally sent and received and that they are now in possession of one or more collectors, probably in the western USA. I am especially eager to track down Lovecraft's letters to Robert Ervin Howard (1930-36) and to Fritz Leiber (1936-37). None of these is in the Lovecraft collection at the Brown University Library or in the custody of my esteemed colleagues Derleth, Leiber, or Lord.

Any information that would enable me to locate these letters or to get in touch with their possessors would be a valued service not only to me but also to the scholarship of imaginative fiction.

L. SPRAGUE DECAMP
278 Hathorpe Lane
Villanova, Pa. 19085
Please contact Sprague.

Dear Sir:
Re your editorial:

You state the pollution/population problem quite aptly, particularly regarding our consumption of energy. If we're lucky, those dirty, messy old power plants which will "fuel" our electric cars will be replaced by fusion-powered stations following a major breakthrough.

But I have a nagging worry that, after a few years of living in the wonderful new era, we'll pick up the *Morning Blab* and see something like, "Scientists Claim F-Plants Are . . ." But, of course, we can't know just *what* the problem will be; we only have Murphy's Law to give us the comforting knowledge that the universe *never* lets us off.

William J. Gorman

If every dark cloud has a silver lining, in other words, the inverse proposition is also true?

Dear John:

Recently I encountered something which seems to me of considerable significance in the early history of science fiction, something which I have never seen mentioned anywhere. It is not so surprising that it has been overlooked all these years, since it occurs in the last place you would expect to find anything science-fictionish—classical opera.

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Caltech—of all places!—has gone arty. The Higher Powers over on California Street have converted from nuclear physics and tensors to choreography and the drama. Their kinesthetic arts are put on view in Beckman Auditorium, a theater of rather intimate type décor, sometimes known among the irreverent as "Beckman's Boudoir." Aside from the fact that the stage lacks depth and has no dressing rooms, it makes a first-class show place.

Last performance I saw at Beckman Aud was Mozart's comic opera "*Così fan tutte*." (A girl friend who is a linguist and native Italian tells me this means approximately "And So Do They All," the *They* referring to women.) I confess I found it mostly a bore except for one scene which struck me as intensely interesting.

A woman arouses two men, apparently dead, by energizing them with a huge horseshoe magnet. Now if that magnet wasn't a piece of science-fiction gadgetry then what was it? Today an author writing the same scene would resort to some very sophisticated instrumentation: a nonlinear optical laser modulator, circadian brain stimulation, or something equally mysterious and incomprehensible to the layman.

But when Mozart wrote "*Così fan tutte*" in 1789, what more mysterious and incomprehensible gimmick was available than a huge magnet?

A professor in Humanities at Caltech tells me he doubts that Mozart dreamed up the magnetism bit. He thinks rather the idea originated with his librettist, Lorenzo da Ponte, a priest, poet, and adventurer, of Venetian Jewish extraction.

After all, when you think about it, it really is not so surprising to find such a device as a huge horseshoe magnet introduced into "*Così fan tutte*." Mesmerism and animal magnetism were hot subjects among the elite in the late Eighteenth Century.

Any comments?

ROBERT S. RICHARDSON

A science-fiction device is something that the knowledge of the time allows one to speculate MIGHT have the abilities ascribed to it. "Così fan tutte," therefore, rates as science fiction!

Dear Mr. Campbell:

Sometime back, you made some irreverent statements about the objectivity—or lack thereof—of scientists. You cited as examples of the human failings of scientists the paper of a Chinese nuclear scientist who devoted much of his paper to praising Mao Tse-tung. When it was pointed out that the paper was an excellent piece of work despite the brown nosing, you gave the deliberate refusal of American Social scientists to investigate possible genetic differences in the races. Your critics offered the weaker de-

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fense that the position was justified because no accurate answer could be obtained with present techniques. The defense sounds much like they would just as soon not find out if the present technique is inadequate or not, but the example of Da Vinci trying to measure the speed of light gives their argument enough weight to prevent offhand dismissal of their defense. We don't know everything yet.

However, I have run across a better example of scientific refusal to look unpleasant facts in the face. The following quote is from "The Vertebrate Story," by Alfred S. Romer. It has been a standard college text for over thirty years and four editions. Page 227 states:

"If the reader has followed through the line of descent of mammals and man to this point and continues it onward later in this chapter toward advanced mammals, he will be struck by one disturbing theme which runs through the entire story from the jawed-fish stage onward. This is the fact that the entire line of descent is, without exception, one of predatory flesh-eaters. The fish ancestors of land vertebrates preyed upon their fellow fish, and the early amphibians had the same diet. Our early reptile ancestors likewise ate animal food: among the pelycosaurs and therapsids were the dominant and most bloodthirsty animals of their day. The progressive line of mammal evolution continue through forms that were at least would-be carnivores, although, as we shall see, many were too small to tackle larger prey than insects. All along the series we see side branches developing as herbivores which—like the dicynodonts—flourished greatly but then died out, while their flesh-eating relatives survived. Is there a moral to this story? Let us not draw one, for if so, it would appear to support the doctrines of such characters as Nietzsche, or the late unlamented Hitler."

The evidence might have been challenged on grounds of incompleteness (most paleontologists would agree that they have only a fraction of the number of fossils they really need) or applicability (Paleontology works in terms of millions of generations. Most social sciences cover only a handful at most.) Instead of refusing to speculate on these scientific grounds, he bases his refusal on the grounds that the results might be disagreeable to him and his ideas. So much for the vaulted "objectivity" of scientists.

DAVID CARL ARGALL
1300 Ballista
La Puente, California 91744

One missing factor is that there must always be far more living herbivores than carnivores, or the carnivores must starve! Therefore, in any period, carnivores are a distinct minority. Less successful life forms?

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Dear Sir:

I am somewhat belatedly commenting on your editorial in the April issue of Analog Science Fiction/Science Fact. I am not normally a science-fiction reader. I have for several years been interested in the social and political effects of televised news, and in searching for possible means of countering its adverse effects; most recently—perhaps as a last resort—considering the media of science fiction.

I believe that Vice President Agnew has performed a national service in giving expression to the feeling that something is wrong with the information conveyed by our news media, even though he may not have expressed the basic fault. Your own editorial contained some thoughts which I had not explicitly recognized before. However, I believe there is an even more fundamental aspect to the problem.

Most reporters and commentators recognize the fact that news is exceptional behavior, and then proceed to forget the fact in formulating their comments. A comparison of news coverage with national statistics indicates that this lightly passed over fact operates with the inevitability of a natural law. The volume and intensity of news coverage is inversely proportional to the quantity and general significance of the event. Thus, in a very good society all of the news is bad, and in a very bad society all of the news would be good—even without government censorship.

Numerous examples could be cited to illustrate the point, and to show the effects of the resulting inverse perspective on entertainment, politics, and general social behavior. However, I will try to stay within the bounds of a reasonable letter.

Poverty became news when it affected the smallest proportion of our population in the history of our nation. And remember when popular novelists almost always wrote about rich people.

Few problems receive greater news coverage than Crime. Yet the President's Crime Commission—in one of its brief lapses into objectivity—said, "The personal injury that Americans risk daily from sources other than crime are enormously greater."

The Crime Commission also said, in a conclusion that received neither publicity nor action:

> "The Commission believes that there is a clear public responsibility to keep citizens fully informed of the facts about crime so that they will have facts to go on when they decide what the risks are and what kinds and amounts of precautionary measures they should take. *Furthermore, without an accurate understanding of the facts, they cannot judge whether the interference with individual liberties*

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which strong crime control measures may involve is a price worth paying. The public obligation to citizens is to provide this information regularly and accurately. *And, if practices for disseminating information give wrong impressions, resources should be committed to developing more accurate methods.*" (emphasis added)

The Commission report provided ample evidence that "practices for disseminating information give wrong impressions."

Prior to the use of electronic communications as a news media, the inverted emphasis of news impacted only on those sufficiently literate and interested to read. Such recipients of news had some basis for corrective judgment. Now the electronic media makes news the primary opinion molding force for millions too immature or too preoccupied to apply any corrective judgment. For such the most exceptional events appear to be the norm, and the real world does not exist. They are at the intellectual mercy of every sensationalist who would exploit any isolated event for power or profit, dragging the rest of us along.

If the electronic media is ever to become a constructive rather than a destructive force, an "antidote for news" must be developed. Ideally, news would be labeled by its proper classification as "current information," placed in context with the total body of related data, and the complete picture presented before any opinions, conclusions, or recommendations were drawn. Unfortunately such an operation requires organization and resources not available to an individual working alone. As a matter of self-preservation, such an effort should be supported by the business enterprises whose advertising budget now supports the destructive force.

You and Vice President Agnew are the only people with constructive concern about the problem whose views have come to my attention, although I am sure there must be others. People I have contacted appear to shy away from the subject, either from a desire to avoid having their opinions disturbed by facts, or in disbelief that there can be such a thing as objective information analysis and reporting. Perhaps a way could be found to bring in contact those whose constructive concern might result in action. Any thoughts on the matter would be greatly appreciated.

CHARLES F. ZIMMERMAN
Bohannon, Virginia 23021

There is also the business of saying in a "factual news report" that "President Nixon claimed that . . ." instead of "President Nixon believes that . . ." or simply "said that . . ." The semantic value of "claimed" carries the implication "he's probably lying"; is that, then, a "factual" report?

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EDITORIAL

continued from page 7

experiment. *All* parents lack that knowledge, specifically including people like Dr. Spock and Dr. Skinner. Therefore *all* parents are *always* experimenting with human beings.

It doesn't matter a bit what you *think* you're doing—it makes no difference how absolutely rock-ribbed certain you are that you do in fact know exactly what the right moves are. There is no predictable correlation whatever between the intensity of your certainty and its correctness.

Matter of fact, there is a high probability of a negative correlation: an absolute certainty that you're right means a fanatic attitude, which prevents learning and self-correction.

Thus two of the most critically important areas of human experience are in the peculiar position that the "authorities" in the field keep saying "you can't perform experiments with human beings," while the fact is that due to lack of knowledge in the areas, innumerable experimental tests are being conducted all around them, and all over the world.

The problem is that the "authorities" in the field keep thinking solely in terms of *laboratory* experiments, where they can control every possible variable, and observe the results in detail.

I started with the problem of astronomy, because that area in many ways resembles the problems of sociology and psychology. The astronomer can't perform laboratory experiments either—he damn well can't manipulate giant stars and test the stability of white dwarfs, or get inside a pre-supernova to see what's happening. He'd sure like to be able to.

And the psychologist would find his work greatly helped if he had true telepathy so he could get inside another mind to see what was happening.

O.K.—so neither one of them can—but the astronomer has had the good sense to acknowledge that, and study the experiments that happen in the galaxies around him, without bitching about the impossibility of making experiments.

Like the sociologist, the astronomer is working with a population having interactions so complex that he can't analyze their movements mathematically, save in the broadest statistical terms. And like the sociologist, he doesn't know all the forces that operate to direct the motions: it's only recently that they've become aware of how important the exceedingly weak, but stupendously extensive galactic magnetic field is. The astrophysicists have a problem just about the same as that of the sociologist.

But they have a different philosophy: the astrophysicist recognizes

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that the stars—which he definitely can't control—*are* experiments he can observe. That he can learn the basics of stellar dynamics not by interfering with them, but by observing them patiently.

Neither the psychologists nor the sociologists have accepted the necessity for using the "natural experiments" all around them adequately—with curious and painful results.

Since it is held unethical to experiment with human beings, but the fact is that we must act in ignorance—a situation which *is* experimenting!—we get around this by loudly proclaiming we know-for-sure what we are doing.

If I know-for-sure what the right answer is, then when I do what I think needs doing, I can hold I am not doing that unethical thing, experimenting with human beings. That makes it ethical for a fanatic to do what he Knows Is The Only Right Thing (Heil Hitler! Or Hail Cromwell! Or "Jesus and No Quarter to the enemy!")

But the thoughtful man who recognizes that his knowledge is imperfect—that he may be mistaken—is unethical, for he is experimenting with his children, or his neighbors, or the people of his city, state or nation.

Only fools are certain they are right about anything so complex as psychology or sociology—and under the doctrine that holds experimenting with human beings is unethical, only fools appear ethical.

The lifetime of a society is greater than the lifetime of any observing man—again, sociology is like astronomy. What's needed, again, is a time machine by which we can trace the development of societies and study the results of this, that, and the other variable. Even if we could introduce a desired variable F, we could not observe its working out until at least three generations of people had interacted and distributed that new factor. If you *could* introduce a new Earth-size planet into the region between Mars and Jupiter, you couldn't determine the consequences in the next ten years, obviously. It wouldn't have had time to make more than two orbits, and the final results of its interactions with the asteroids would be completely unknown—far too complex for computation.

Halley was the first to show that the "fixed stars" *did* move—and he did it not by super-accurate measurement, or new experimental techniques—he did it by recognizing and using traditional values. In two thousand years, the effects showed up clearly and measurably.

Now one of the great problems of human life is that much of human personality extends beyond the reach of logic—because logic is a useful, but inadequate tool.

Logic—mathematical logic—is an inadequate tool for the astrono-

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mer, too; the motions and interactions of a hundred billion stars are beyond the ability of mathematical logic to analyze.

The interactions of two billion human beings—even if each unit were strictly logically controlled—would be beyond formal logical analysis.

Therefore, a formally-logical sociology is necessarily almost useless, save as an intellectual game.

Complicating the matter however is the fact that human beings have nonlogical—and I mean higher-than-logical, not anti-logical!—abilities. Any formal logician, who really knows what logic is, will assure you that logic is a science of manipulation of postulates according to rules—but it can *never generate a postulate*. It can only derive conclusions from postulates that are introduced from some nonlogical source.

Consider the following logical argument:

If all men are green, and all green things are explosive, then all men are explosive.

That, my friend, is unshakably valid logic. The explosive nature of men is an inescapable conclusion.

Oh, sure—it happens that the postulates are false. But the *logic* is perfect.

And because we have no communicable technique for deriving postulates, people observing the same situations derive differing postulates, then using the same logical techniques reach conclusions that each holds inescapable. There is *no logical way* to evaluate a postulate, because logic does not apply to postulates. They are generated by an as-yet-unknown method that exists outside of, and underlies, all logic.

(The rules of logic are themselves postulates, incidentally.)

The only way to test the validity of a postulate is to check not against someone else's postulate-logic system—you may both be entirely wrong!—but against the real universe of experience.

Events are *not* logical; they are simply True. This can best be appreciated directly by considering the problem of demonstrating something that is highly improbable; if it can be shown to be a one in a billion probability by logical-mathematical analysis, when it happens it is neither probable nor improbable—it is only True. A *repetition* of the event may then be declared highly improbable—but any event is True, and beyond the realm of logic. It's the Ultimate Arbitrary; you can argue *from* it, but no logical argument can alter it. A witness should be arbitrary and not subject to persuasion, because he should be reporting an event, which is True.

Wherefore the only proper check of the validity of postulates is to compare them with events. If logical derivations from the postulates correctly predict what happens,

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you have reason to put some trust in your postulates.

Now herein lies the importance of traditions, and traditional values. Like the 2,000-year-old star maps that allowed Halley to see that Arcturus and Aldebaran had moved, traditions represent postulates that have been tested-in-action over long periods of time.

They may not be completely and precisely correct—but only a fool would hold that they were valueless. They represent the results obtained by experiments performed on millions of human beings, over centuries of time.

They are, in fact, the basic data on which a sound sociology, or sound psychology, must be based; they're the experimental results that the modern "authorities" in those fields say we can't get because we can't perform experiments with human beings.

Traditions are valuable not because they're traditional, but because they are the rule-of-thumb engineering results from ages of experiments performed on/by millions of human beings under widely varying conditions.

The old Roman engineers were very weak on theory; unlike the Greek theoreticians, the Romans didn't do much arguing about philosophy—they built things, and sought only to find practical working rules of how-to-do-it. They didn't understand force-vectors, Young's Modulus, or the chemistry of mortar, but they built magnificent arch bridges, and great domes that have stood for two thousand years. Some of their works are still in practical operation. They were lousy theorists—but their rule-of-thumb traditions of how to build a bridge that wouldn't fall down *worked.*

The fact that you cannot understand, or explain, something has nothing whatever to do with its validity.

It would behoove any would-be engineer stumbling across such a structure to study and appreciate it. And any would-be theoretician would be wise to understand that for his field of study, such a bridge is an Event; it's true, and he'd better try to understand why, instead of trying to explain it away as useless—old-fashioned—a mere tribal mores—things have changed.

Sure they have—but the basic laws haven't. We use steel reinforced concrete rather than mortared stone, but we also use the principle of the arch.

The importance of traditions is not that they're traditional and we ought to worship antiques—but that they are old, and have grown old in service.

They worked.

Like Roman aqueducts and bridges, they're still functioning usefully after millennia of use. They must have great basic laws underlying them or they'd have crumbled before this. The Editor.

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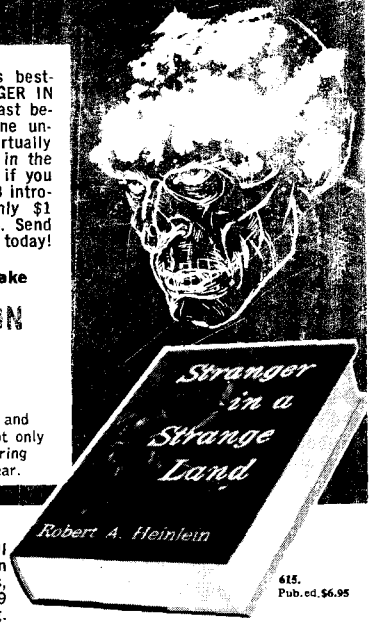

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